Shinco®

SERVICE MANUAL

Inverter Split system Air Conditioner

R410A

Model:

KFR-25GWZ/BM
KFR-35GWZ/BM
KFR-50GWZ/BM
KFR-70GWZ/BM

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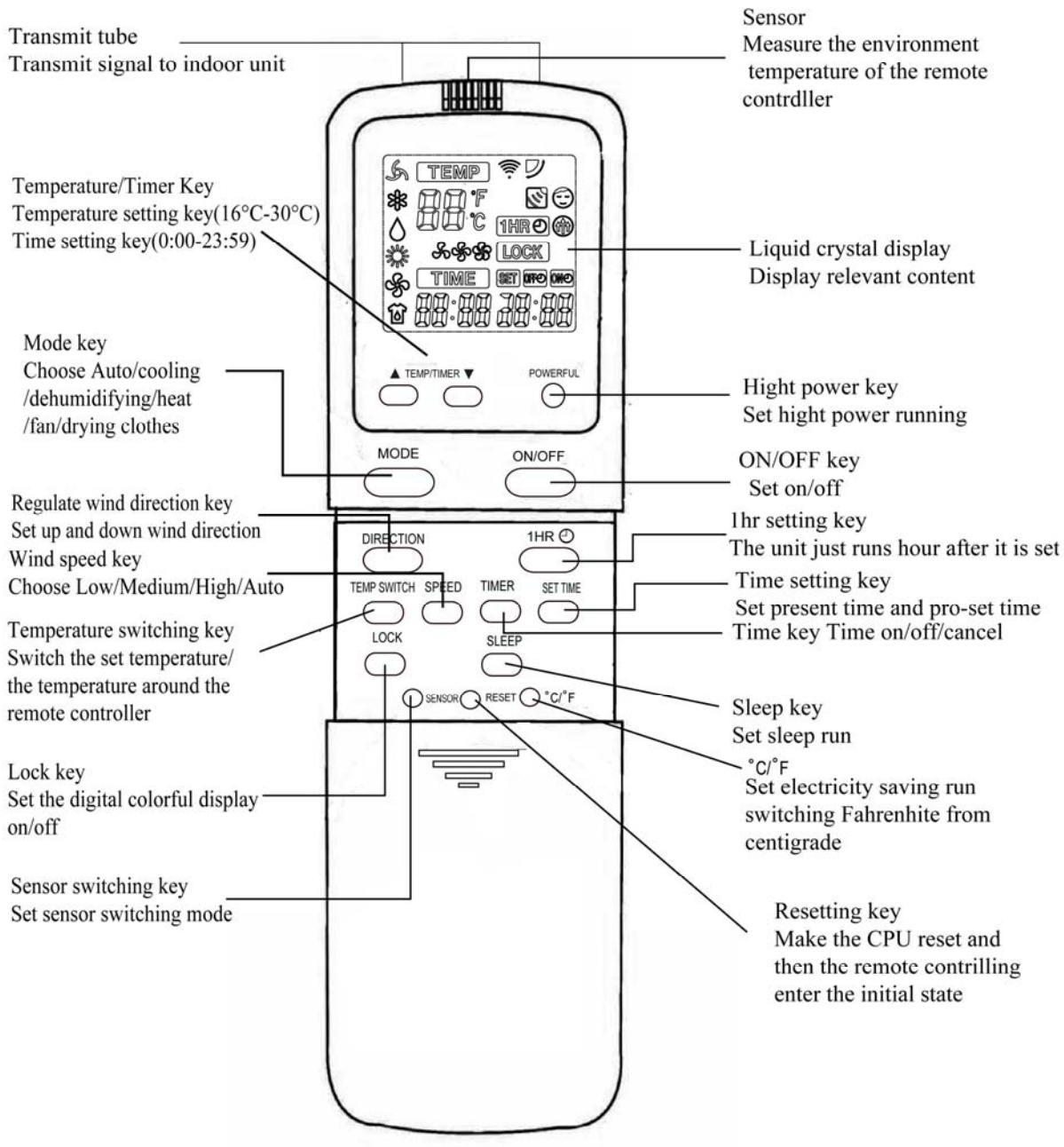
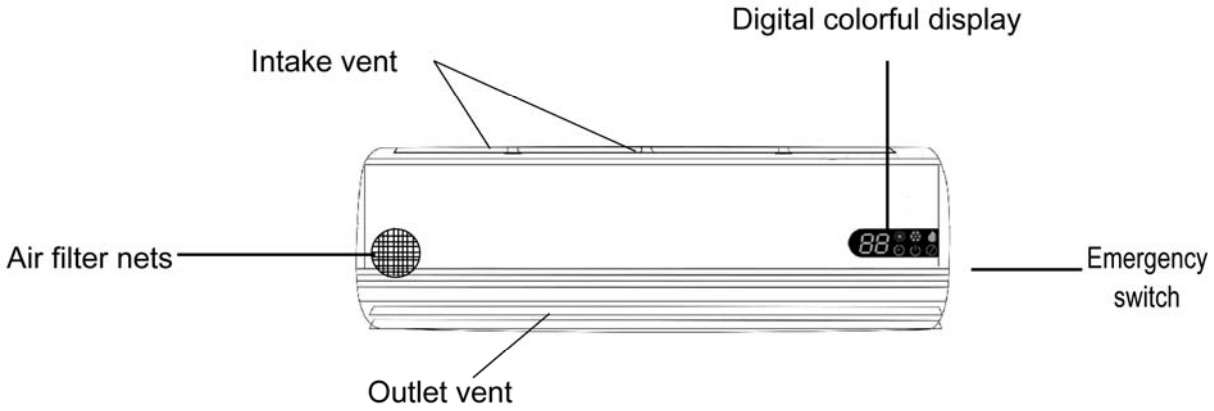
Part I

1. Introductions of Part Names and Functions

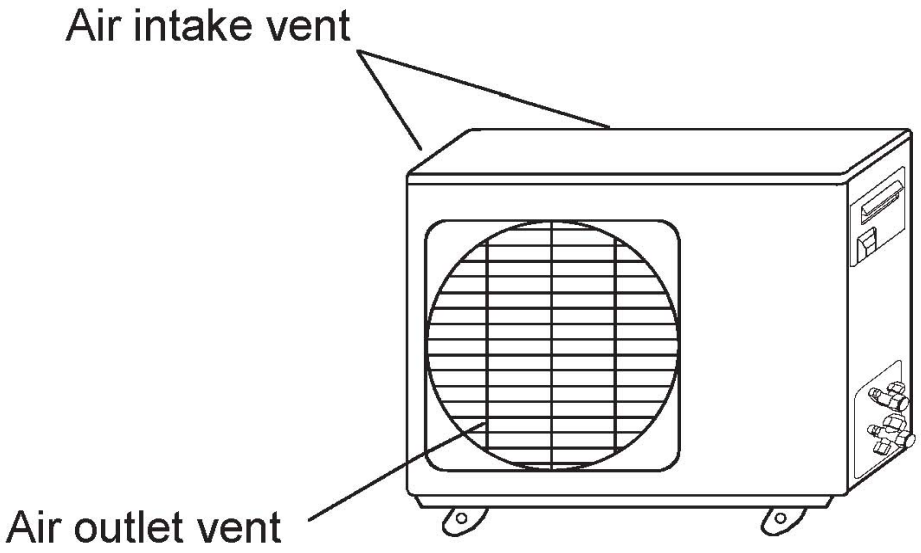
1.1 Remote controller



1.2 Indoor panel

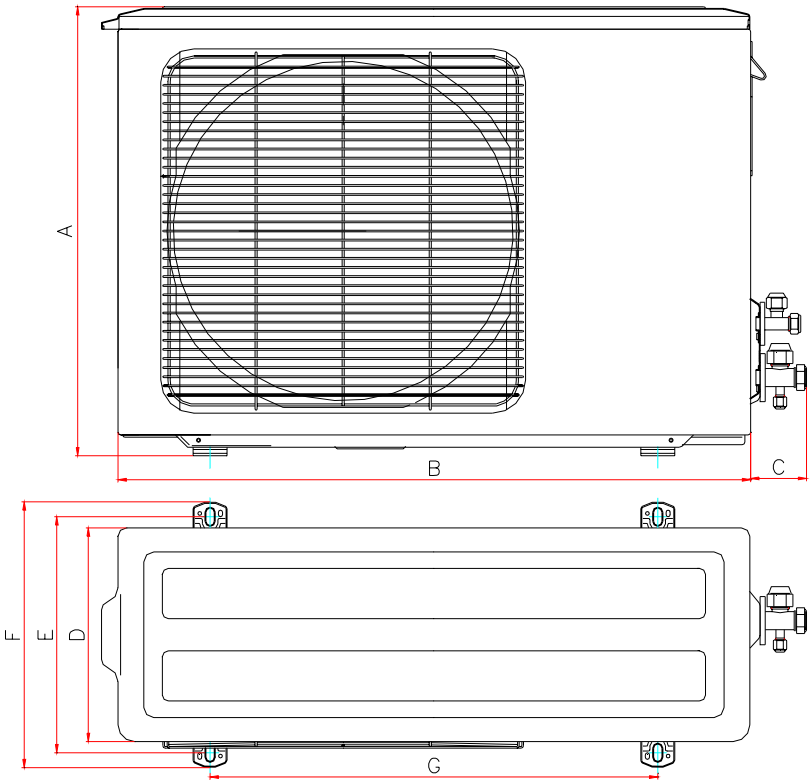


1.3 Outdoor panel



2. Outline Dimension of Indoor and Outdoor Units

2.1. Outdoor unit

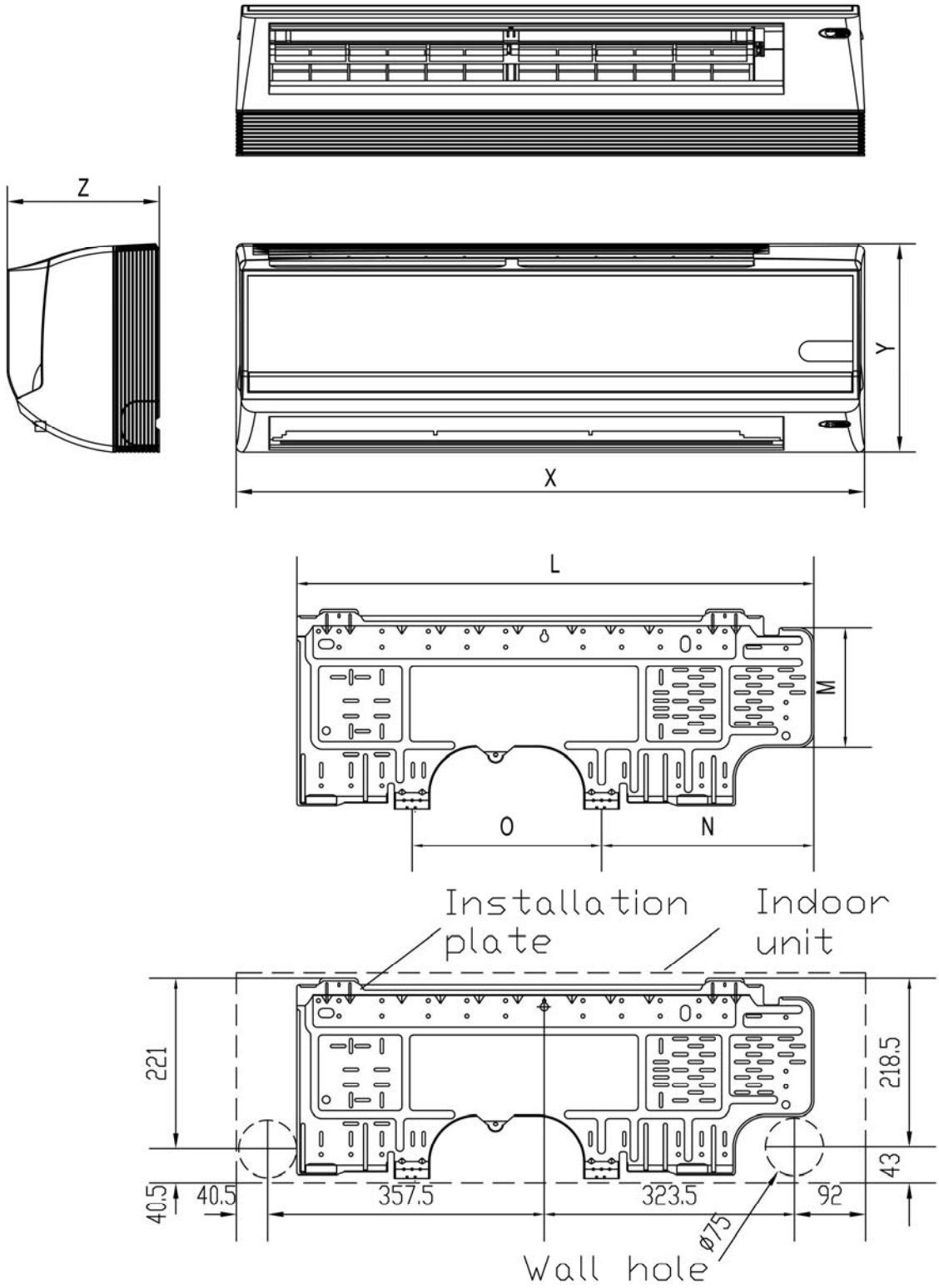


SIZE mm / MODEL	A	B	C	D	E	F	G
KFR-25GWZ/BM	542	762	58	257	285	321	540
KFR-35GWZ/BM	542	762	58	257	285	321	540
KFR-50GWZ/BM	656	865	52	307	339.5	372	633
KFR-70GWZ/BM	840	950	60	352	388	425	582

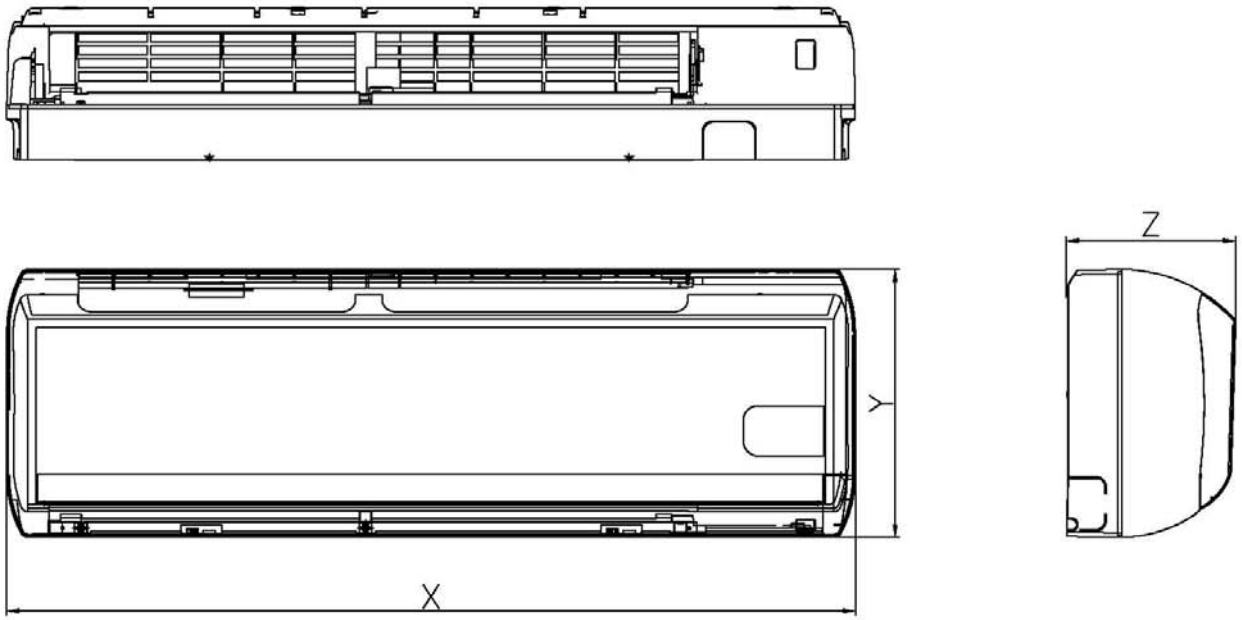
2.2 Indoor unit

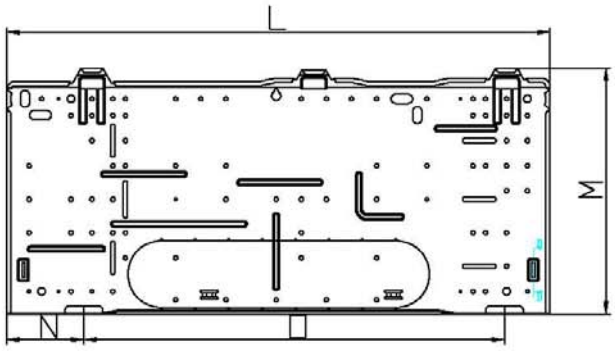
Unit：mm

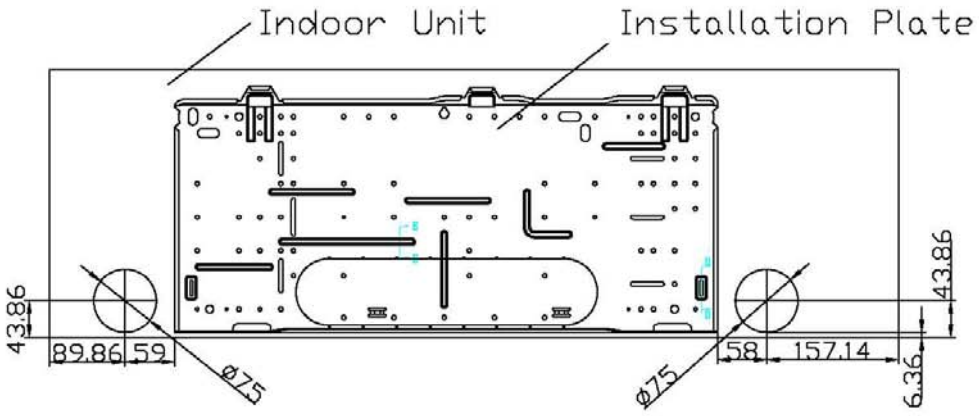
KFR-25GWZ/BM
KFR-35GWZ/BM



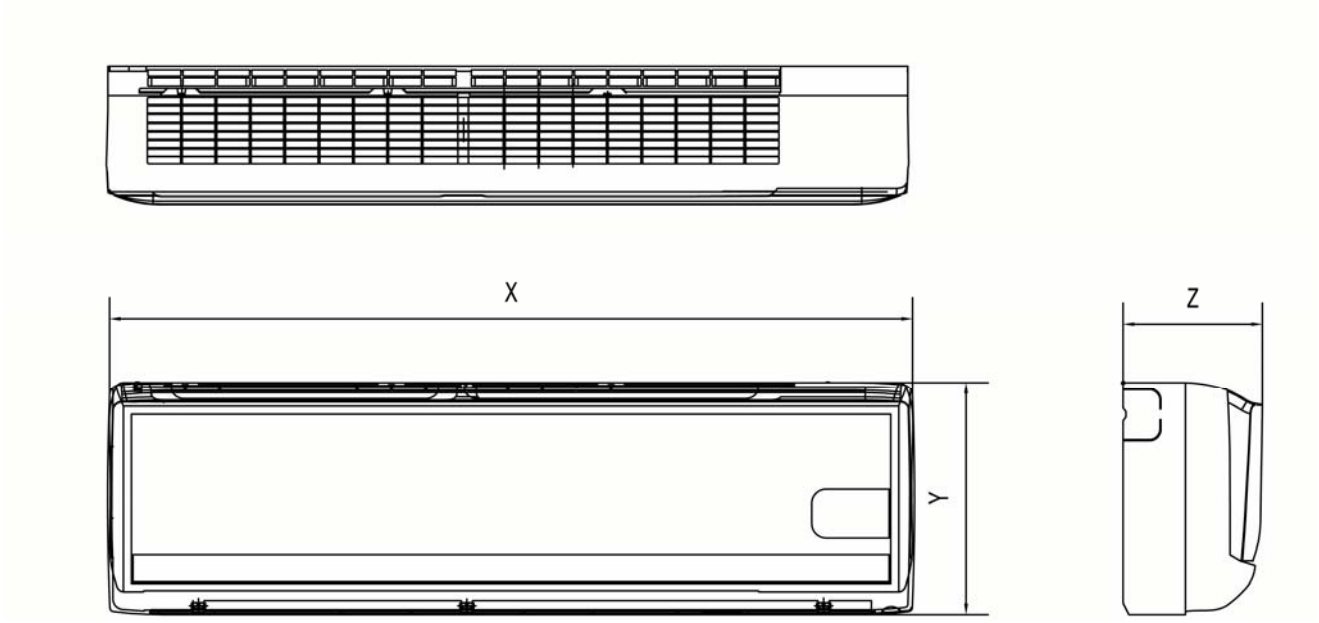
KFR-50GWZ/BM

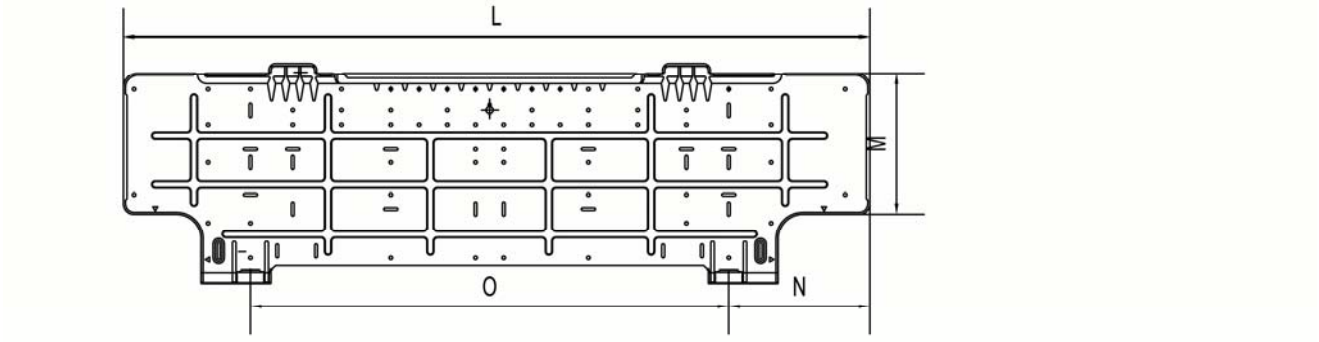

Z
Y
X

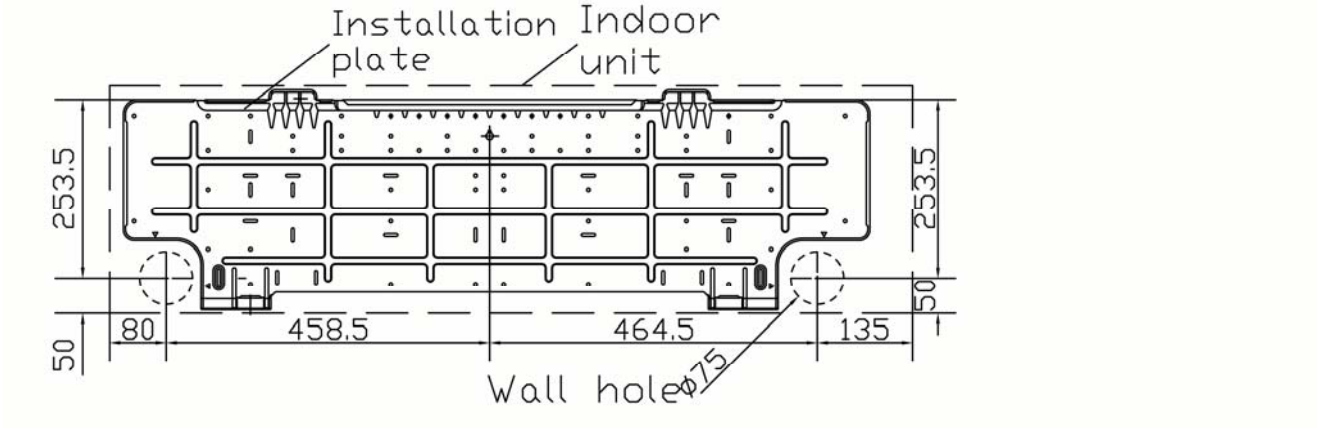

L
M
N


Indoor Unit
Installation Plate
43.86
89.86
59
ø75
58
157.14
43.86
6.36
ø75

KFR-70GWZ/BM


X
Y
Z


L
M
O
N


Installation plate
Indoor unit
253.5
253.5
50
50
80
458.5
464.5
135
Wall hole ϕ75

SIZE mm / MODEL	X	Y	Z	L	M	N	O
KFR-25GWZ/BM	814	272	197	604	255	55	498
KFR-35GWZ/BM	814	272	197	604	255	55	498
KFR-50GWZ/BM	1013	323	198	648	295	57	502
KFR-70GWZ/BM	1138	323	212	1055	312	180	679

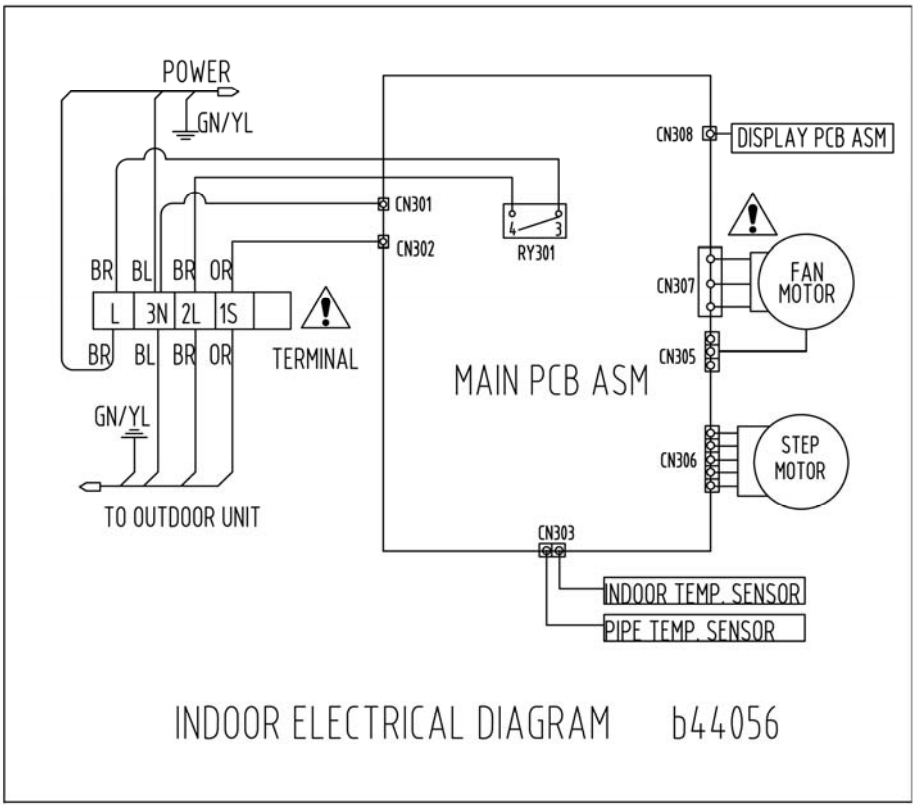
3. Specification

Product type	**KFR-25GWZ/BM**	**KFR-35GWZ/BM**	**KFR-50GWZ/BM**	**KFR-70GWZ/BM**
Product Number Indoor	bem25117610/G33	bem35117610/G33	bem50117603/G36	bem70117603/G37
Outdoor	bem25127610/W6	bem35127610/W6	bem50127603/W18	bem70127603/W13
Style	Ductless mini split AC system(heat pump)	Ductless mini split AC system(heat pump)	Ductless mini split AC system(heat pump)	Ductless mini split AC system(heat pump)
Compressor	Toshiba(rotary type DC INVERTER)	Toshiba(rotary type DC INVERTER)	Panasonic(rotary type DC INVERTER)	Panasonic(rotary type DC INVERTER)
Refrigerant	R410A(pre-charged)	R410A(pre-charged)	R410A(pre-charged)	R410A(pre-charged)
Cooling Capacity	9000BTU	12000BTU	18000BTU	24000BTU
Heating Capacity	10400BTU	13650BTU	19100BTU	27000BTU
Application Area	10~18 ㎡	16~24 ㎡	20~34 ㎡	32~47 ㎡
Power Supply	230v/60Hz	230v/60Hz	230v/60Hz	230v/60Hz
Input Power	765W(cool)/880W(heat)	1075W(cool)/1160W(heat)	1670W(cool)/1720W(heat)	2400W(cool)/2550W(heat)
Input Current	3.4A(cool)/3.9A(heat)	4.9A(cool)/5.3A(heat)	7.6A(cool)/7.8A(heat)	10.4A(cool)/11.1A(heat)
SEER	13.8	13.6	14.5	13.3
HSPF	7.8	7.7	7.8	7.9
Sound Level	40dB(A)/54dB(A)	42dB(A)/55dB(A)	50dB(A)/58dB(A)	55dB(A)/62dB(A)
Dehumidify Capacity(l/h)	0.85	1.5	1.7	2.1
Min Operating Temp	-7	-7	-7	-7
Control System	Digital Multifunction infrared Remote control with indoor unit dynamic digital LED display	Digital Multifunction infrared Remote control with indoor unit dynamic digital LCD display	Digital Multifunction infrared Remote control with indoor unit dynamic digital LCD display	Digital Multifunction infrared Remote control with indoor unit dynamic digital LCD display
Net weight(Kg/lbs)	11kg/24lbs(in), 40kg/88lbs(out)	11kg/24lbs(in), 43kg/95lbs(out)	16kg/35lbs(in),51kg/112 lbs(out)	17kg/37lbs(in),68kg/150 lbs(out)
Dimensions(mm/inches)	814×192×272mm 32×7.6×10.7inches(in) 762×257×542mm 30×10.1×21.3inches(out)	814×192×272mm 32×7.6×10.7inches(in) 762×257×542mm 30×10.1×21.3inches(out)	1013×198×323mm 39.9 × 7.8 × 12.7inches(in) 865×307×656mm 34×12×25.8inches(out)	1138×212×323mm/ 44.8 × 8.3 × 12.7inches(in) 950×352×840mm 37.4×13.8×33inches(out)
Line Set Connection	3 m connecting pipe	3 m connecting pipe	4 m connecting pipe	4 m connecting pipe
Certificates	ETL	ETL	ETL	ETL

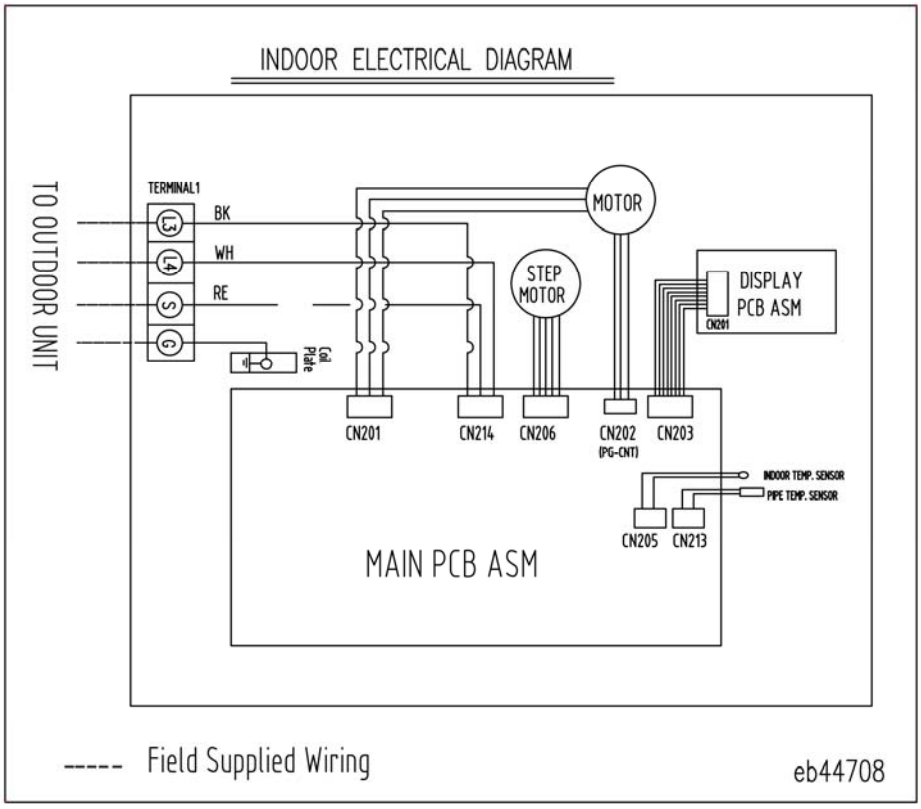
4. Wiring Diagram

4.1 Indoor unit Wiring diagram

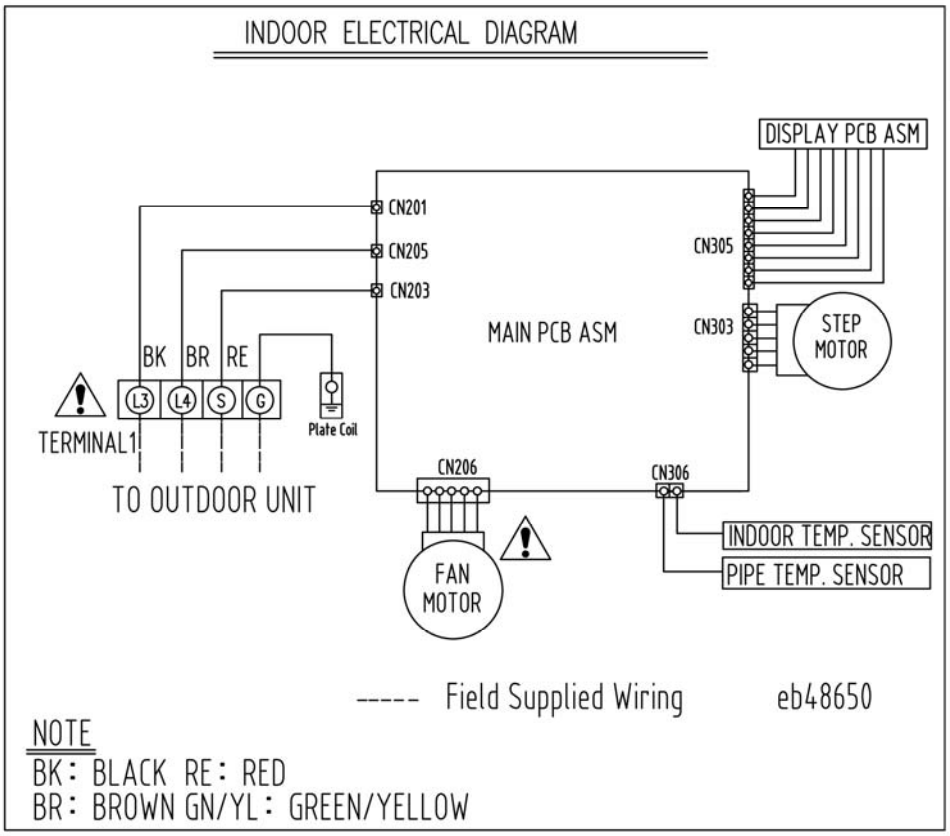
KFR-25GWZ/BM



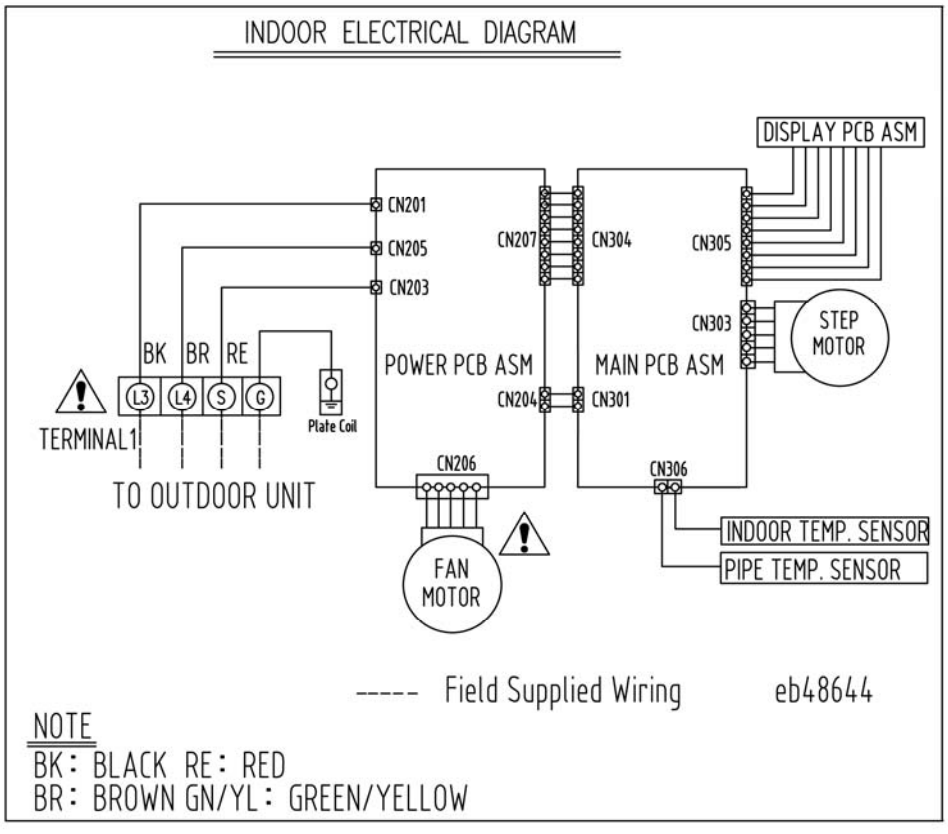
KFR-35GWZ/BM



KFR-50GWZ/BM

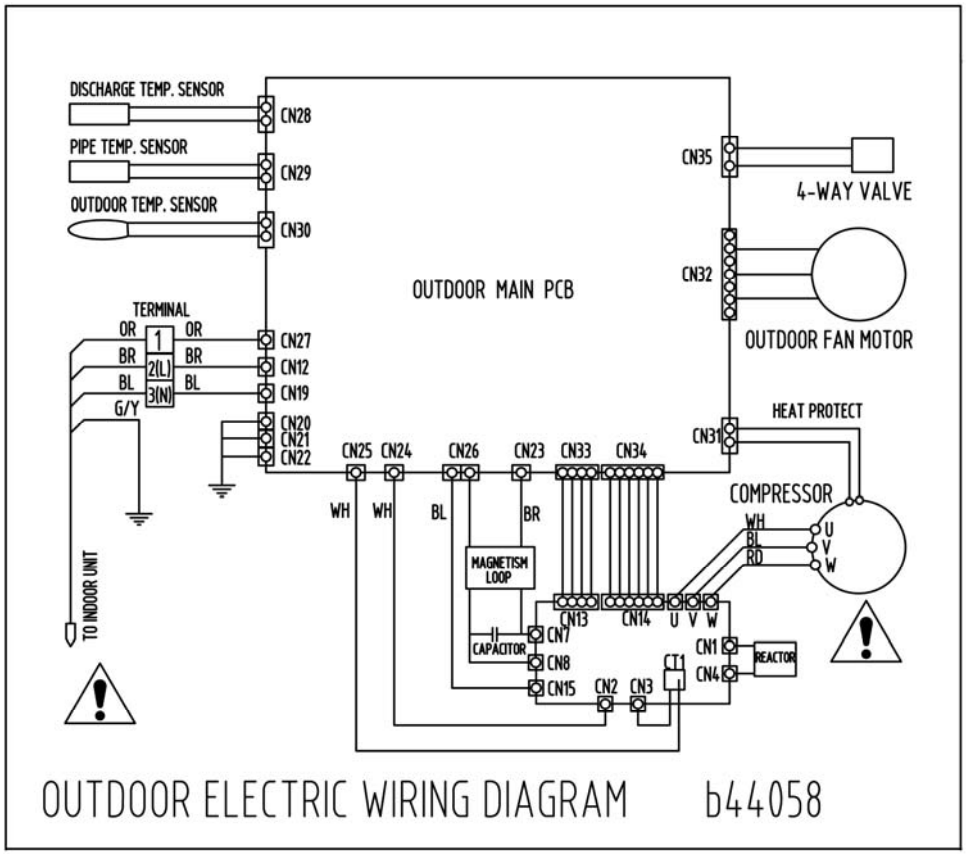


KFR-70GWZ/BM

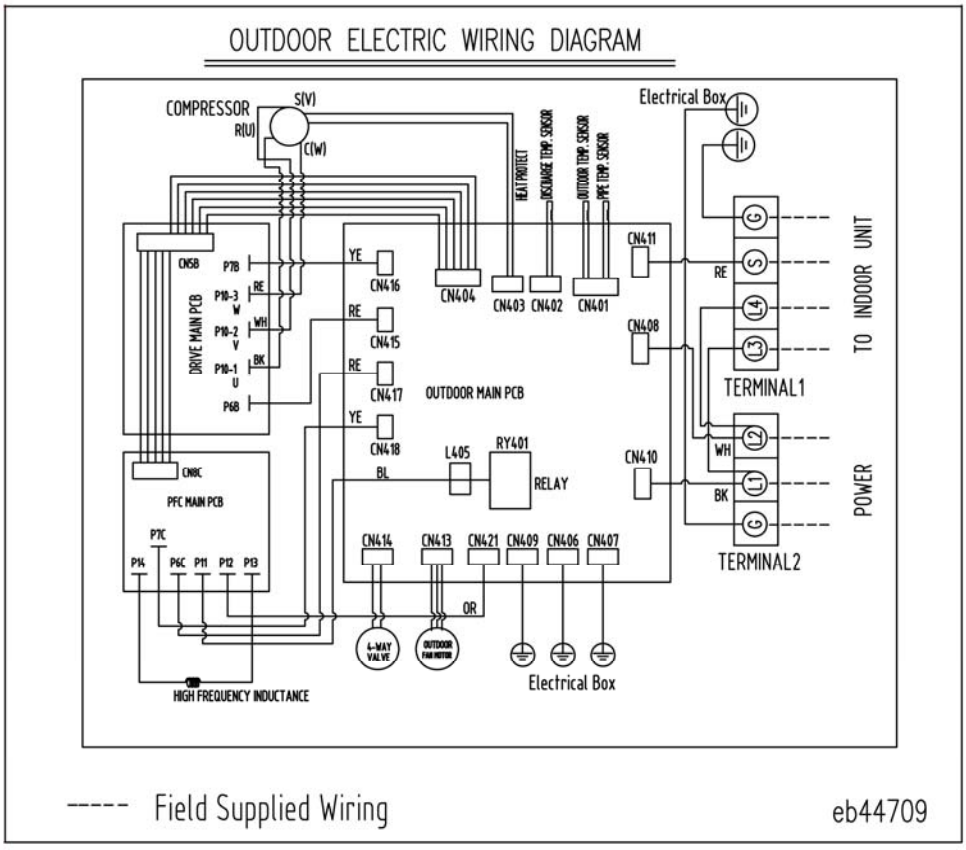


4.2 Outdoor unit Wiring diagram

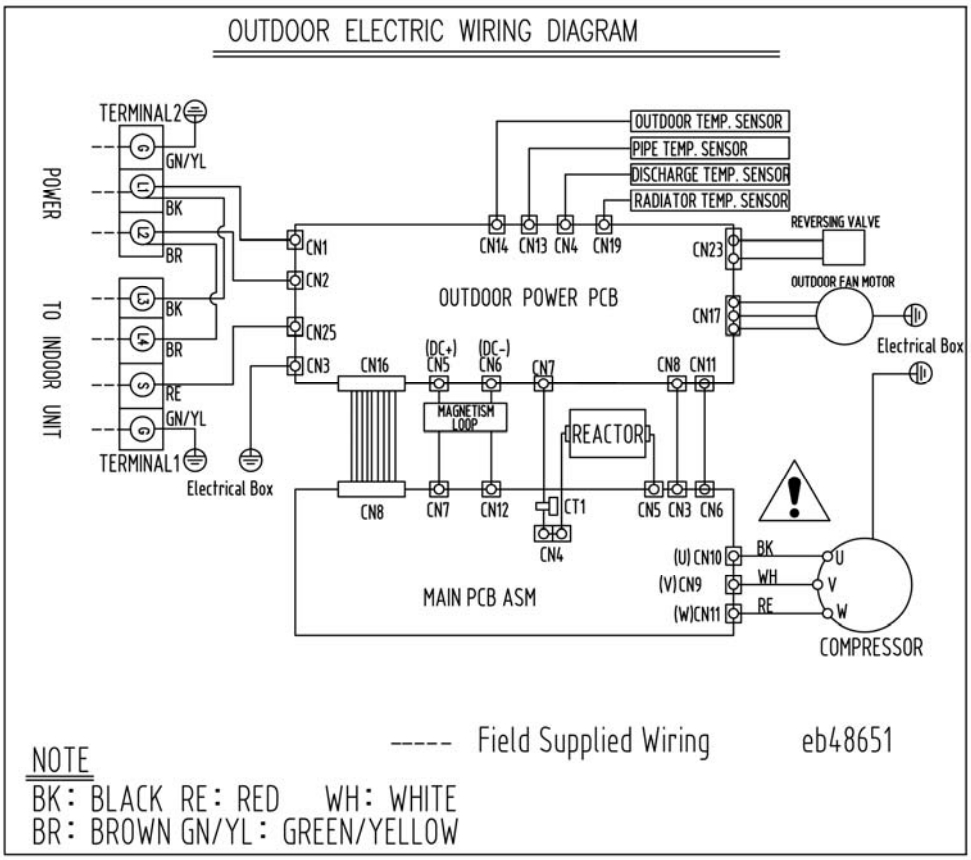
KFR-25GWZ/BM



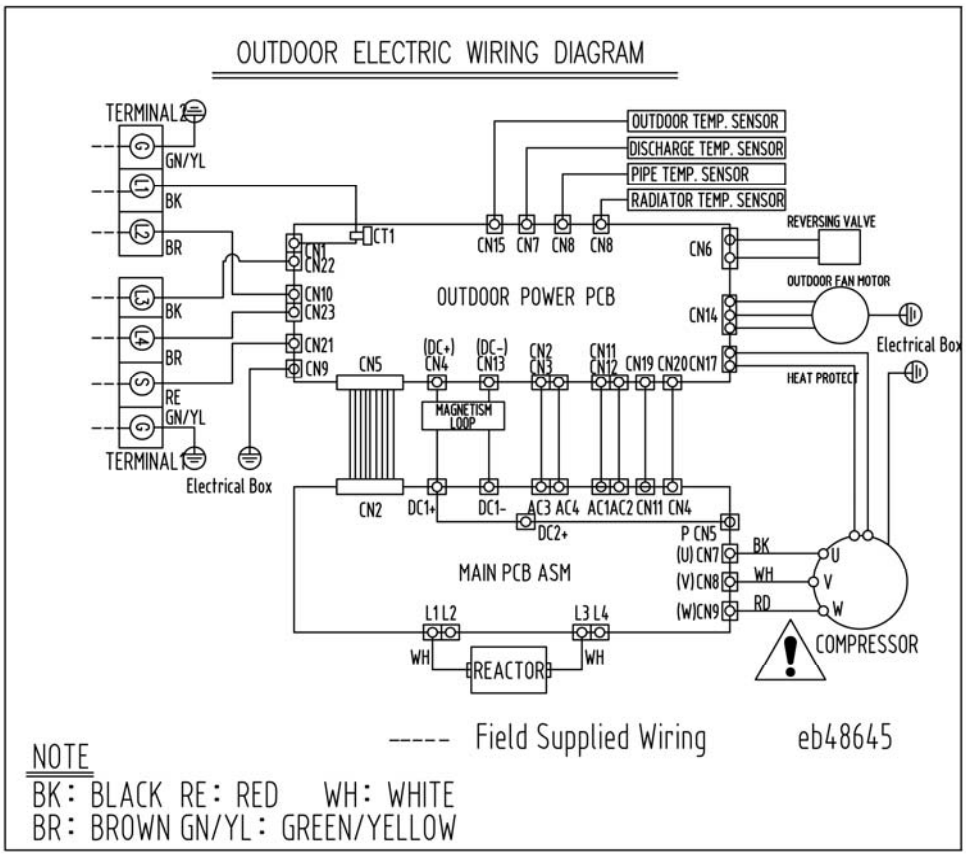
KFR-35GWZ/BM



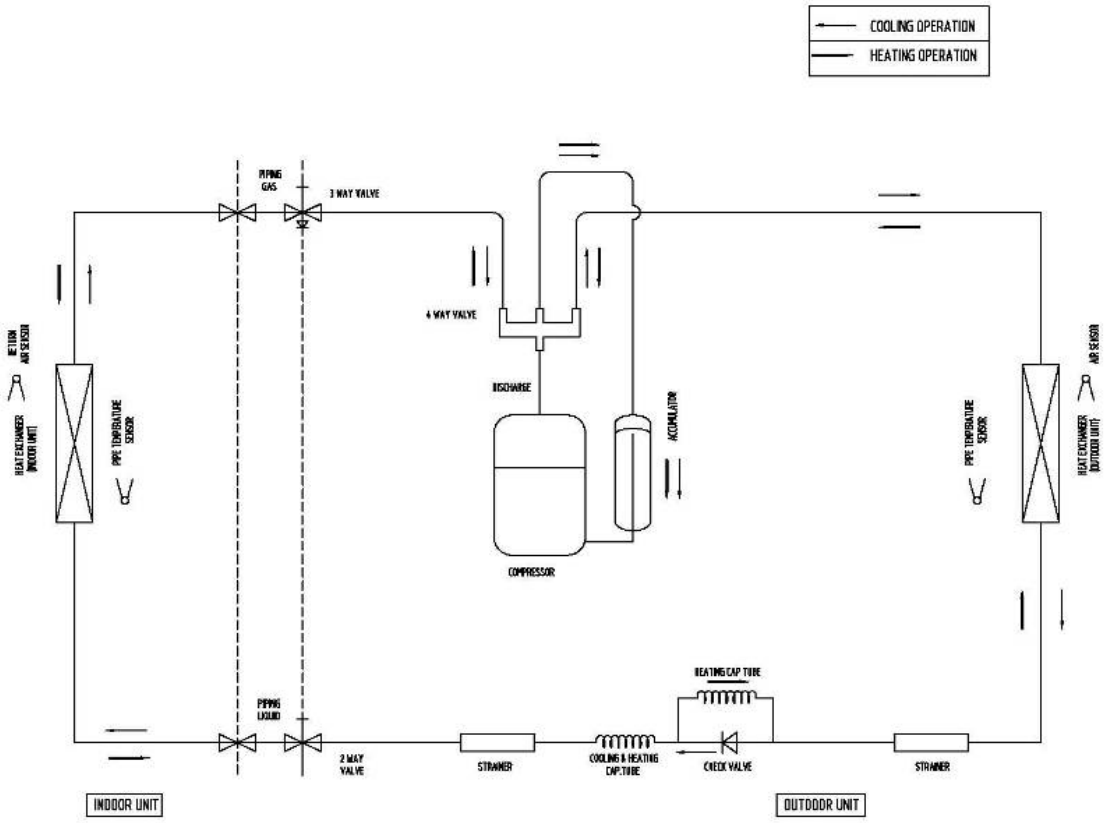
KFR-50GWZ/BM



KFR-70GWZ/BM



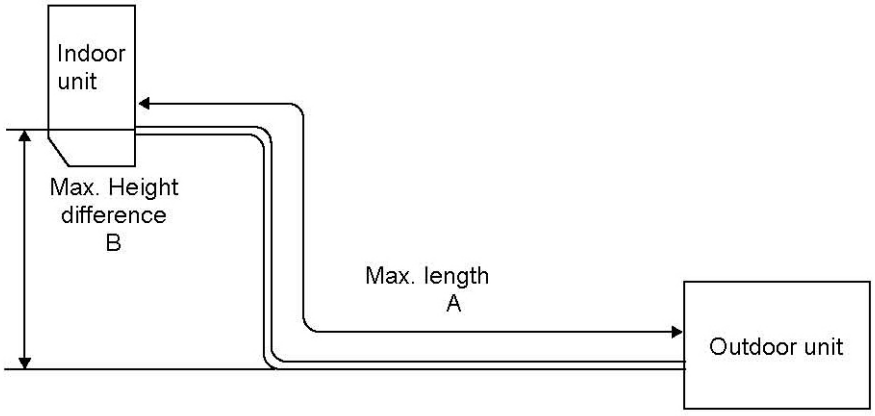
5. Refrigerant system diagram



6. Max. refrigerant piping length and max. height difference

6.1 Piping length and height difference

MODEL	REFRIGERANT PIPING:M		PIPING SIZE O.D:mm	
	Max. length	Max. Height difference	Gas	Liquid
KFR-25GWZ/BM	15	5	9.52	6.35
KFR-35GWZ/BM KFR-50GWZ/BM	15	5	12.7	6.35
KFR-70GWZ/BM	15	5	9.52	12.88



6.2 Additional refrigerant Charge (R410A:g)

Model	Outdoor unit precharged (G)	Refrigerant piping length(one way)										
		5m	6m	7m	8m	9m	10m	11m	12m	13m	14m	15m
KFR-25GWZ/BM	840	0	20	40	60	80	100	120	140	160	180	200
KFR-35GWZ/BM	1130	0	30	60	90	120	150	180	210	240	270	300
KFR-50GWZ/BM	1300	0	30	60	90	120	150	180	210	240	270	300
KFR-70GWZ/BM	1900	0	50	100	150	200	250	300	350	400	450	500

7. Sensor Resistance Table

7.1 KFR-25GWZ/BM、KFR-35GWZ/BM Sensor Resistance Table

7.1.1 indoor air sensor、indoor pipe sensor、outdoor air sensor、outdoor pipe sensor R-T datasheet 10K±0.5% ; 3976K±0.5%, B(25/85)=3976K±0.5% R-T datasheet

Temp.(℃)	R(KΩ)	Temp.(℃)	R(KΩ)	Temp.(℃)	R(KΩ)	Temp.(℃)	R(KΩ)
-30	**180.719**	4	**26.832**	38	**5.764**	72	**1.627**
-29	**169.891**	5	**25.522**	39	**5.534**	73	**1.573**
-28	**159.763**	6	**24.284**	40	**5.315**	74	**1.522**
-27	**150.289**	7	**23.113**	41	**5.105**	75	**1.472**
-26	**141.422**	8	**22.006**	42	**4.905**	76	**1.425**
-25	**133.124**	9	**20.958**	43	**4.713**	77	**1.379**
-24	**125.355**	10	**19.967**	44	**4.530**	78	**1.335**
-23	**118.079**	11	**19.028**	45	**4.355**	79	**1.293**
-22	**111.264**	12	**18.139**	46	**4.188**	80	**1.252**
-21	**104.879**	13	**17.297**	47	**4.028**	81	**1.213**
-20	**98.895**	14	**16.499**	48	**3.875**	82	**1.176**
-19	**93.284**	15	**15.742**	49	**3.728**	83	**1.140**
-18	**88.023**	16	**15.024**	50	**3.588**	84	**1.105**
-17	**83.089**	17	**14.344**	51	**3.454**	85	**1.072**
-16	**78.458**	18	**13.698**	52	**3.325**	86	**1.040**
-15	**74.112**	19	**13.085**	53	**3.202**	87	**1.009**
-14	**70.032**	20	**12.503**	54	**3.084**	88	**0.980**
-13	**66.200**	21	**11.950**	55	**2.971**	89	**0.951**
-12	**62.599**	22	**11.425**	56	**2.863**	90	**0.924**
-11	**59.216**	23	**10.926**	57	**2.760**	91	**0.897**
-10	**56.035**	24	**10.451**	58	**2.660**	92	**0.872**
-9	**53.044**	25	**10.000**	59	**2.565**	93	**0.848**
-8	**50.231**	26	**9.571**	60	**2.474**	94	**0.824**
-7	**47.583**	27	**9.162**	61	**2.386**	95	**0.802**
-6	**45.091**	28	**8.773**	62	**2.302**	96	**0.780**
-5	**42.744**	29	**8.403**	63	**2.221**	97	**0.760**
-4	**40.534**	30	**8.051**	64	**2.144**	98	**0.740**
-3	**38.451**	31	**7.715**	65	**2.070**	99	**0.720**
-2	**36.487**	32	**7.395**	66	**1.998**	100	**0.702**
-1	**34.636**	33	**7.090**	67	**1.930**	101	**0.684**
0	**32.890**	34	**6.799**	68	**1.864**	102	**0.667**
1	**31.242**	35	**6.522**	69	**1.801**	103	**0.651**
2	**29.687**	36	**6.257**	70	**1.741**	104	**0.635**
3	**28.219**	37	**6.005**	71	**1.683**	105	**0.620**

7.1.2 outdoor discharge pipe R(0)=187.25K±6.3% ;B(0/100)=3979K±1% R-T datasheet

Temp.(℃)	R(min) (KΩ)	R(cent) (KΩ)	R(max) (KΩ)	ΔR(min)	ΔR(max)
-20	488.35	526.61	565.60	-7.3%	7.4%
-19	461.94	497.84	534.41	-7.2%	7.3%
-18	437.15	470.87	505.17	-7.2%	7.3%
-17	413.89	445.57	477.76	-7.1%	7.2%
-16	392.05	421.83	462.06	-7.1%	9.5%
-15	371.54	399.54	427.94	-7.0%	7.1%
-14	352.27	378.61	405.31	-7.0%	7.1%
-13	334.16	358.96	384.06	-6.9%	7.0%
-12	317.13	340.48	364.10	-6.9%	6.9%
-11	301.11	323.11	345.34	-6.8%	6.9%
-10	286.03	306.77	327.71	-6.8%	6.8%
-9	271.83	291.40	311.13	-6.7%	6.8%
-8	258.46	276.92	295.52	-6.7%	6.7%
-7	245.86	263.29	280.83	-6.6%	6.7%
-6	233.98	250.44	266.99	-6.6%	6.6%
-5	222.78	238.33	253.96	-6.5%	6.6%
-4	212.20	226.91	241.67	-6.5%	6.5%
-3	202.22	216.13	230.07	-6.4%	6.4%
-2	192.79	205.95	219.13	-6.4%	6.4%
-1	183.88	196.34	208.80	-6.3%	6.3%
0	175.45	187.25	199.05	-6.3%	6.3%
1	167.33	178.66	190.00	-6.3%	6.3%
2	159.64	170.53	181.45	-6.4%	6.4%
3	152.37	162.84	173.34	-6.4%	6.4%
4	145.49	155.56	165.67	-6.5%	6.5%
5	138.97	148.66	158.39	-6.5%	6.5%
6	132.80	142.12	151.49	-6.6%	6.6%
7	126.95	135.92	144.94	-6.6%	6.6%
8	121.40	130.03	138.73	-6.6%	6.7%
9	116.13	124.45	132.83	-6.7%	6.7%
10	111.13	119.14	127.22	-6.7%	6.8%
11	106.38	114.10	121.89	-6.8%	6.8%
12	101.87	109.31	116.82	-6.8%	6.9%
13	97.585	104.75	112.00	-6.8%	6.9%
14	93.506	100.42	107.41	-6.9%	7.0%
15	89.625	96.289	103.04	-6.9%	7.0%
16	85.930	92.358	98.873	-7.0%	7.1%
17	82.411	88.612	94.902	-7.0%	7.1%
18	79.058	85.042	91.116	-7.0%	7.1%
19	75.861	81.637	87.503	-7.1%	7.2%
20	72.813	78.388	84.055	-7.1%	7.2%
21	69.904	75.287	80.768	-7.1%	7.3%
22	67.128	72.326	77.618	-7.2%	7.3%
23	64.477	69.498	74.612	-7.2%	7.4%
24	61.945	66.795	71.738	-7.3%	7.4%
25	59.525	64.210	68.990	-7.3%	7.4%
26	57.211	61.739	66.360	-7.3%	7.5%
27	54.998	59.373	63.843	-7.4%	7.5%
28	52.880	57.110	61.433	-7.4%	7.6%
29	50.853	54.942	59.124	-7.4%	7.6%
30	48.913	52.866	56.911	-7.5%	7.7%

31	47.054	50.876	54.791	-7.5%	7.7%
32	45.273	48.939	52.757	-7.5%	7.8%
33	43.565	47.140	50.806	-7.6%	7.8%
34	41.928	45.386	48.934	-7.6%	7.8%
35	40.358	43.703	47.137	-7.7%	7.9%
36	38.852	42.087	45.412	-7.7%	7.9%
37	37.408	40.536	43.755	-7.7%	7.9%
38	36.018	39.047	42.163	-7.8%	8.0%
39	34.685	37.616	40.632	-7.8%	8.0%
40	33.404	36.240	39.162	-7.8%	8.1%
41	32.174	34.919	37.747	-7.9%	8.1%
42	30.991	33.648	36.387	-7.9%	8.1%
43	29.855	32.426	35.078	-7.9%	8.2%
44	28.761	31.250	33.819	-8.0%	8.2%
45	27.710	30.119	32.606	-8.0%	8.3%
46	26.699	29.030	31.439	-8.0%	8.3%
47	25.725	27.982	30.315	-8.1%	8.3%
48	24.788	26.973	29.233	-8.1%	8.4%
49	23.887	26.001	28.190	-8.1%	8.4%
50	23.018	25.065	27.185	-8.2%	8.5%
51	22.182	24.163	26.217	-8.2%	8.5%
52	21.377	23.295	25.284	-8.2%	8.5%
53	20.601	22.457	24.384	-8.3%	8.6%
54	19.854	21.650	23.516	-8.3%	8.6%
55	19.133	20.873	22.680	-8.3%	8.7%
56	18.439	20.123	21.873	-8.4%	8.7%
57	17.770	19.399	21.094	-8.4%	8.7%
58	17.125	18.702	20.343	-8.4%	8.8%
59	16.503	18.029	19.618	-8.5%	8.8%
60	15.903	17.380	18.920	-8.5%	8.9%
61	15.324	16.754	18.245	-8.5%	8.9%
62	14.766	16.150	17.594	-8.6%	8.9%
63	14.228	15.568	16.965	-8.6%	9.0%
64	13.709	15.005	16.358	-8.6%	9.0%
65	13.209	14.463	15.772	-8.7%	9.1%
66	12.726	13.939	15.207	-8.7%	9.1%
67	12.260	13.433	14.681	-8.7%	9.3%
68	11.810	12.946	14.134	-8.8%	9.2%
69	11.376	12.475	13.650	-8.8%	9.4%
70	10.958	12.020	13.133	-8.8%	9.3%
71	10.554	11.581	12.658	-8.9%	9.3%
72	10.164	11.158	12.200	-8.9%	9.3%
73	9.7880	10.749	11.757	-8.9%	9.4%
74	9.4251	10.354	11.330	-9.0%	9.4%
75	9.0749	9.9733	10.917	-9.0%	9.5%
76	8.7370	9.6055	10.518	-9.0%	9.5%
77	8.4109	9.2505	10.134	-9.1%	9.6%
78	8.0962	8.9078	9.7618	-9.1%	9.6%
79	7.7926	8.5770	9.4028	-9.1%	9.6%
80	7.4997	8.2577	9.0562	-9.2%	9.7%
81	7.2170	7.9495	8.7215	-9.2%	9.7%
82	6.9443	7.6520	8.3983	-9.2%	9.8%
83	6.6812	7.3649	8.0883	-9.3%	9.8%

84	6.4273	7.0878	7.7850	-9.3%	9.8%
85	6.1825	6.8204	7.4942	-9.4%	9.9%
86	5.9462	6.5623	7.2135	-9.4%	9.9%
87	5.7184	6.3133	6.9424	-9.4%	10.0%
88	5.4987	6.0731	6.6808	-9.5%	10.0%
89	5.2867	5.8413	6.4284	-9.5%	10.1%
90	5.0827	5.6177	6.1847	-9.5%	10.1%
91	4.8853	5.4018	5.9495	-9.6%	10.1%
92	4.6953	5.1939	5.7226	-9.6%	10.2%
93	4.5121	4.9932	5.5037	-9.6%	10.2%
94	4.3355	4.7997	5.2925	-9.7%	10.3%
95	4.1653	4.6131	5.0840	-9.7%	10.2%
96	4.0012	4.4331	4.8922	-9.7%	10.4%
97	3.8431	4.2596	4.7026	-9.8%	10.4%
98	3.6908	4.0924	4.5198	-9.8%	10.4%
99	3.5440	3.9312	4.3435	-9.8%	10.5%
100	3.4025	3.7759	4.1735	-9.9%	10.5%
101	3.2663	3.6262	4.0097	-9.9%	10.6%
102	3.1351	3.4819	3.8517	-10.0%	10.6%
103	3.0087	3.3429	3.6995	-10.0%	10.7%
104	2.8870	3.2090	3.5528	-10.0%	10.7%
105	2.7699	3.0801	3.4114	-10.1%	10.8%
106	2.6571	2.9559	3.2720	-10.1%	10.7%
107	2.5485	2.8363	3.1440	-10.1%	10.8%
108	2.4441	2.7211	3.0176	-10.2%	10.9%
109	2.3435	2.6103	2.8959	-10.2%	10.9%
110	2.2468	2.5036	2.7787	-10.3%	11.0%
111	2.1537	2.4009	2.6658	-10.3%	11.0%
112	2.0642	2.3021	2.5572	-10.3%	11.1%
113	1.9781	2.2070	2.4526	-10.4%	11.1%
114	1.8954	2.1155	2.3519	-10.4%	11.2%
115	1.8158	2.0276	2.2551	-10.4%	11.2%
116	1.7393	1.9430	2.1619	-10.5%	11.3%
117	1.6657	1.8616	2.0723	-10.5%	11.3%
118	1.5951	1.7834	1.9861	-10.6%	11.4%
119	1.5272	1.7082	1.9032	-10.6%	11.4%
120	1.4619	1.6359	1.8234	-10.6%	11.5%

7.2 KFR-50GWZ/BM、KFR-70GWZ/BM Sensor Resistance Table

7.2.1 indoor air sensor R(25)=5K±2% ;B(25/50)=3950K±2% R-T datasheet

Temp.(℃)	R(min) (KΩ)	R(cent) (KΩ)	R(max) (KΩ)	ΔR(min)	ΔR(max)
-20	44.23	47.70	51.40	-7.3%	7.8%
-19	41.82	45.05	48.49	-7.2%	7.6%
-18	39.55	42.56	45.76	-7.1%	7.5%
-17	37.43	40.23	43.20	-7.0%	7.4%
-16	35.43	38.03	40.80	-6.9%	7.3%
-15	33.54	35.97	38.54	-6.8%	7.1%
-14	31.77	34.04	36.43	-6.7%	7.0%
-13	30.11	32.22	34.44	-6.5%	6.9%
-12	28.54	30.50	32.57	-6.4%	6.8%
-11	27.06	28.89	30.82	-6.3%	6.7%
-10	25.66	27.37	29.17	-6.2%	6.6%
-9	24.35	25.94	27.61	-6.1%	6.4%

-8	23.11	24.59	26.15	-6.0%	6.3%
-7	21.94	23.33	24.78	-5.9%	6.2%
-6	20.84	22.13	23.48	-5.8%	6.1%
-5	19.79	21.00	22.26	-5.7%	6.0%
-4	18.81	19.94	21.11	-5.6%	5.9%
-3	17.88	18.93	20.03	-5.5%	5.8%
-2	17.00	17.98	19.00	-5.5%	5.7%
-1	16.17	17.09	18.04	-5.4%	5.6%
0	15.39	16.24	17.13	-5.3%	5.5%
1	14.64	15.44	16.27	-5.2%	5.3%
2	13.94	14.69	15.46	-5.1%	5.2%
3	13.28	13.97	14.69	-5.0%	5.1%
4	12.65	13.30	13.96	-4.9%	5.0%
5	12.05	12.66	13.28	-4.8%	4.9%
6	11.49	12.05	12.63	-4.7%	4.8%
7	10.95	11.48	12.02	-4.6%	4.7%
8	10.44	10.93	11.44	-4.5%	4.6%
9	9.961	10.42	10.89	-4.4%	4.5%
10	9.504	9.934	10.37	-4.3%	4.4%
11	9.071	9.472	9.881	-4.2%	4.3%
12	8.660	9.034	9.416	-4.1%	4.2%
13	8.270	8.619	8.974	-4.1%	4.1%
14	7.899	8.225	8.556	-4.0%	4.0%
15	7.547	7.851	8.159	-3.9%	3.9%
16	7.212	7.496	7.783	-3.8%	3.8%
17	6.894	7.159	7.427	-3.7%	3.7%
18	6.592	6.839	7.088	-3.6%	3.6%
19	6.305	6.534	6.767	-3.5%	3.6%
20	6.031	6.245	6.462	-3.4%	3.5%
21	5.771	5.971	6.172	-3.3%	3.4%
22	5.524	5.710	5.897	-3.3%	3.3%
23	5.288	5.461	5.635	-3.2%	3.2%
24	5.064	5.225	5.386	-3.1%	3.1%
25	4.850	5.000	5.150	-3.0%	3.0%
26	4.638	4.786	4.934	-3.1%	3.1%
27	4.437	4.582	4.728	-3.2%	3.2%
28	4.245	4.388	4.532	-3.3%	3.3%
29	4.063	4.203	4.344	-3.3%	3.4%
30	3.890	4.027	4.166	-3.4%	3.4%
31	3.724	3.859	3.996	-3.5%	3.5%
32	3.567	3.699	3.833	-3.6%	3.6%
33	3.417	3.547	3.679	-3.7%	3.7%
34	3.274	3.401	3.531	-3.7%	3.8%
35	3.138	3.263	3.389	-3.8%	3.9%
36	3.008	3.130	3.255	-3.9%	4.0%
37	2.884	3.004	3.126	-4.0%	4.1%
38	2.766	2.883	3.003	-4.1%	4.1%
39	2.654	2.768	2.885	-4.1%	4.2%
40	2.546	2.658	2.773	-4.2%	4.3%
41	2.444	2.553	2.665	-4.3%	4.4%
42	2.346	2.453	2.563	-4.4%	4.5%
43	2.252	2.357	2.464	-4.4%	4.6%
44	2.163	2.265	2.370	-4.5%	4.6%

45	2.077	2.178	2.280	-4.6%	4.7%
46	1.996	2.094	2.194	-4.7%	4.8%
47	1.918	2.014	2.112	-4.7%	4.9%
48	1.843	1.937	2.033	-4.8%	5.0%
49	1.772	1.863	1.958	-4.9%	5.1%
50	1.704	1.793	1.885	-5.0%	5.1%
51	1.639	1.726	1.816	-5.0%	5.2%
52	1.577	1.662	1.749	-5.1%	5.3%
53	1.517	1.600	1.686	-5.2%	5.4%
54	1.460	1.541	1.625	-5.3%	5.5%
55	1.405	1.484	1.566	-5.3%	5.5%
56	1.353	1.430	1.510	-5.4%	5.6%
57	1.303	1.378	1.456	-5.5%	5.7%
58	1.255	1.328	1.405	-5.5%	5.8%
59	1.209	1.280	1.355	-5.6%	5.8%
60	1.164	1.235	1.308	-5.7%	5.9%
61	1.122	1.191	1.262	-5.7%	6.0%
62	1.082	1.148	1.218	-5.8%	6.1%
63	1.043	1.108	1.176	-5.9%	6.2%
64	1.006	1.069	1.136	-5.9%	6.2%
65	0.9698	1.032	1.097	-6.0%	6.3%
66	0.9355	0.9960	1.060	-6.1%	6.4%
67	0.9025	0.9616	1.024	-6.1%	6.5%
68	0.8709	0.9286	0.9892	-6.2%	6.5%
69	0.8406	0.8969	0.9561	-6.3%	6.6%
70	0.8115	0.8664	0.9243	-6.3%	6.7%
71	0.7835	0.8372	0.8936	-6.4%	6.7%
72	0.7567	0.8090	0.8642	-6.5%	6.8%
73	0.7309	0.7819	0.8359	-6.5%	6.9%
74	0.7061	0.7559	0.8086	-6.6%	7.0%
75	0.6822	0.7309	0.7824	-6.7%	7.0%
76	0.6593	0.7068	0.7571	-6.7%	7.1%
77	0.6373	0.6837	0.7328	-6.8%	7.2%
78	0.6161	0.6614	0.7094	-6.8%	7.3%
79	0.5958	0.6400	0.6868	-6.9%	7.3%
80	0.5762	0.6193	0.6651	-7.0%	7.4%
81	0.5573	0.5995	0.6442	-7.0%	7.5%
82	0.5392	0.5804	0.6241	-7.1%	7.5%
83	0.5218	0.5619	0.6047	-7.1%	7.6%
84	0.5050	0.5442	0.5859	-7.2%	7.7%
85	0.4888	0.5271	0.5679	-7.3%	7.7%
86	0.4732	0.5106	0.5505	-7.3%	7.8%
87	0.4582	0.4948	0.5337	-7.4%	7.9%
88	0.4438	0.4795	0.5176	-7.4%	7.9%
89	0.4299	0.4647	0.5020	-7.5%	8.0%
90	0.4165	0.4505	0.4869	-7.6%	8.1%
91	0.4036	0.4368	0.4724	-7.6%	8.1%
92	0.3911	0.4236	0.4584	-7.7%	8.2%
93	0.3791	0.4109	0.4449	-7.7%	8.3%
94	0.3676	0.3986	0.4318	-7.8%	8.3%
95	0.3564	0.3867	0.4192	-7.8%	8.4%
96	0.3456	0.3753	0.4071	-7.9%	8.5%
97	0.3353	0.3642	0.3953	-8.0%	8.5%

98	0.3253	0.3536	0.3840	-8.0%	8.6%
99	0.3156	0.3433	0.3730	-8.1%	8.7%
100	0.3063	0.3333	0.3624	-8.1%	8.7%
101	0.2973	0.3237	0.3522	-8.2%	8.8%
102	0.2886	0.3144	0.3423	-8.2%	8.9%
103	0.2802	0.3055	0.3327	-8.3%	8.9%
104	0.2721	0.2968	0.3235	-8.3%	9.0%
105	0.2643	0.2885	0.3146	-8.4%	9.0%
106	0.2568	0.2804	0.3059	-8.4%	9.1%
107	0.2495	0.2726	0.2976	-8.5%	9.2%
108	0.2424	0.2650	0.2895	-8.5%	9.2%
109	0.2356	0.2577	0.2817	-8.6%	9.3%
110	0.2290	0.2507	0.2741	-8.6%	9.4%
111	0.2227	0.2438	0.2668	-8.7%	9.4%
112	0.2165	0.2372	0.2597	-8.7%	9.5%
113	0.2106	0.2309	0.2529	-8.8%	9.5%
114	0.2048	0.2247	0.2462	-8.8%	9.6%
115	0.1993	0.2187	0.2398	-8.9%	9.7%
116	0.1939	0.2129	0.2336	-8.9%	9.7%
117	0.1887	0.2073	0.2276	-9.0%	9.8%
118	0.1837	0.2019	0.2217	-9.0%	9.8%
119	0.1788	0.1966	0.2161	-9.1%	9.9%
120	0.1741	0.1916	0.2106	-9.1%	9.9%
121	0.1695	0.1866	0.2053	-9.2%	10.0%
122	0.1651	0.1819	0.2002	-9.2%	10.1%
123	0.1608	0.1772	0.1952	-9.3%	10.1%
124	0.1567	0.1728	0.1903	-9.3%	10.2%
125	0.1527	0.1684	0.1857	-9.4%	10.2%
126	0.1488	0.1642	0.1811	-9.4%	10.3%
127	0.1450	0.1602	0.1767	-9.5%	10.3%
128	0.1414	0.1562	0.1725	-9.5%	10.4%
129	0.1379	0.1524	0.1683	-9.5%	10.4%
130	0.1344	0.1487	0.1643	-9.6%	10.5%
131	0.1311	0.1451	0.1604	-9.6%	10.6%
132	0.1279	0.1416	0.1566	-9.7%	10.6%
133	0.1248	0.1382	0.1530	-9.7%	10.7%
134	0.1218	0.1349	0.1494	-9.8%	10.7%
135	0.1188	0.1318	0.1459	-9.8%	10.8%
136	0.1160	0.1287	0.1426	-9.8%	10.8%
137	0.1132	0.1257	0.1393	-9.9%	10.9%
138	0.1106	0.1228	0.1362	-9.9%	10.9%
139	0.1080	0.1199	0.1331	-10.0%	11.0%
140	0.1055	0.1172	0.1301	-10.0%	11.0%
141	0.1030	0.1145	0.1272	-10.1%	11.1%
142	0.1007	0.1120	0.1244	-10.1%	11.1%
143	0.0984	0.1095	0.1217	-10.1%	11.2%
144	0.0961	0.1070	0.1190	-10.2%	11.2%
145	0.0940	0.1047	0.1165	-10.2%	11.3%
146	0.0919	0.1024	0.1140	-10.3%	11.3%
147	0.0898	0.1001	0.1115	-10.3%	11.4%
148	0.0878	0.0980	0.1092	-10.3%	11.4%
149	0.0859	0.0959	0.1069	-10.4%	11.5%
150	0.0840	0.0938	0.1046	-10.4%	11.5%

151	0.0822	0.0918	0.1025	-10.5%	11.6%
152	0.0805	0.0899	0.1003	-10.5%	11.6%
153	0.0787	0.0880	0.0983	-10.5%	11.7%
154	0.0771	0.0862	0.0963	-10.6%	11.7%
155	0.0755	0.0844	0.0943	-10.6%	11.8%
156	0.0739	0.0827	0.0924	-10.6%	11.8%
157	0.0724	0.0810	0.0906	-10.7%	11.9%
158	0.0709	0.0794	0.0888	-10.7%	11.9%
159	0.0694	0.0778	0.0871	-10.7%	11.9%
160	0.0680	0.0762	0.0854	-10.8%	12.0%

7.2.2 indoor pipe sensor R(0)=188.1K±4% ; B(0/50)3877K±3% R-T datasheet

Temp.(℃)	R(min) (KΩ)	R(cent) (KΩ)	R(max) (KΩ)	ΔR(min)	ΔR(max)
-20	510.22	548.83	589.42	-7.0%	7.4%
-19	482.84	518.50	555.89	-6.9%	7.2%
-18	457.10	490.02	524.47	-6.7%	7.0%
-17	432.88	463.28	495.02	-6.6%	6.9%
-16	410.09	438.16	467.39	-6.4%	6.7%
-15	388.64	414.55	441.47	-6.2%	6.5%
-14	368.44	392.35	417.14	-6.1%	6.3%
-13	349.41	371.47	394.30	-5.9%	6.1%
-12	331.47	351.83	372.84	-5.8%	6.0%
-11	314.56	333.34	352.67	-5.6%	5.8%
-10	298.61	315.93	333.72	-5.5%	5.6%
-9	283.56	299.53	315.89	-5.3%	5.5%
-8	269.36	284.07	299.11	-5.2%	5.3%
-7	255.95	269.50	283.32	-5.0%	5.1%
-6	243.28	255.77	268.46	-4.9%	5.0%
-5	231.32	242.81	254.46	-4.7%	4.8%
-4	220.01	230.58	241.27	-4.6%	4.6%
-3	209.31	219.03	228.84	-4.4%	4.5%
-2	199.20	208.13	217.11	-4.3%	4.3%
-1	189.63	197.83	206.06	-4.1%	4.2%
0	180.58	188.10	195.62	-4.0%	4.0%
1	171.49	178.90	186.34	-4.1%	4.2%
2	162.91	170.20	177.54	-4.3%	4.3%
3	154.80	161.98	169.21	-4.4%	4.5%
4	147.14	154.19	161.32	-4.6%	4.6%
5	139.91	146.82	153.83	-4.7%	4.8%
6	133.06	139.85	146.74	-4.9%	4.9%
7	126.59	133.24	140.01	-5.0%	5.1%
8	120.47	126.98	133.62	-5.1%	5.2%
9	114.68	121.05	127.57	-5.3%	5.4%
10	109.20	115.42	121.81	-5.4%	5.5%
11	104.00	110.09	116.35	-5.5%	5.7%
12	99.085	105.03	111.16	-5.7%	5.8%
13	94.425	100.23	106.23	-5.8%	6.0%
14	90.008	95.680	101.55	-5.9%	6.1%
15	85.822	91.355	97.091	-6.1%	6.3%
16	81.851	87.249	92.855	-6.2%	6.4%
17	78.085	83.349	88.825	-6.3%	6.6%
18	74.511	79.643	84.992	-6.4%	6.7%

19	71.119	76.120	81.343	-6.6%	6.9%
20	67.899	72.772	77.870	-6.7%	7.0%
21	64.840	69.587	74.562	-6.8%	7.1%
22	61.935	66.558	71.412	-6.9%	7.3%
23	59.175	63.676	68.411	-7.1%	7.4%
24	56.551	60.934	65.550	-7.2%	7.6%
25	54.057	58.323	62.824	-7.3%	7.7%
26	51.685	55.836	60.225	-7.4%	7.9%
27	49.429	53.469	57.746	-7.6%	8.0%
28	47.282	51.213	55.381	-7.7%	8.1%
29	45.239	49.063	53.125	-7.8%	8.3%
30	43.295	47.014	50.971	-7.9%	8.4%
31	41.443	45.061	48.916	-8.0%	8.6%
32	39.679	43.198	46.953	-8.1%	8.7%
33	37.999	41.421	45.078	-8.3%	8.8%
34	36.398	39.726	43.288	-8.4%	9.0%
35	34.872	38.108	41.576	-8.5%	9.1%
36	33.418	36.563	39.941	-8.6%	9.2%
37	32.031	35.089	38.378	-8.7%	9.4%
38	30.708	33.681	36.883	-8.8%	9.5%
39	29.445	32.336	35.454	-8.9%	9.6%
40	28.241	31.051	34.086	-9.0%	9.8%
41	27.091	29.823	32.778	-9.2%	9.9%
42	25.994	28.649	31.526	-9.3%	10.0%
43	24.946	27.527	30.327	-9.4%	10.2%
44	23.945	26.454	29.180	-9.5%	10.3%
45	22.988	25.428	28.081	-9.6%	10.4%
46	22.075	24.446	27.029	-9.7%	10.6%
47	21.201	23.507	26.021	-9.8%	10.7%
48	20.367	22.607	25.055	-9.9%	10.8%
49	19.568	21.747	24.129	-10.0%	11.0%
50	18.805	20.923	23.241	-10.1%	11.1%
51	18.075	20.133	22.391	-10.2%	11.2%
52	17.376	19.378	21.575	-10.3%	11.3%
53	16.708	18.653	20.792	-10.4%	11.5%
54	16.068	17.959	20.041	-10.5%	11.6%
55	15.455	17.294	19.321	-10.6%	11.7%
56	14.869	16.657	18.630	-10.7%	11.8%
57	14.307	16.045	17.966	-10.8%	12.0%
58	13.769	15.459	17.329	-10.9%	12.1%
59	13.253	14.897	16.717	-11.0%	12.2%
60	12.759	14.357	16.130	-11.1%	12.3%
61	12.286	13.840	15.565	-11.2%	12.5%
62	11.832	13.343	15.023	-11.3%	12.6%
63	11.396	12.866	14.502	-11.4%	12.7%
64	10.979	12.408	14.001	-11.5%	12.8%
65	10.578	11.969	13.520	-11.6%	13.0%
66	10.194	11.546	13.057	-11.7%	13.1%
67	9.8257	11.141	12.612	-11.8%	13.2%
68	9.4720	10.751	12.184	-11.9%	13.3%
69	9.1324	10.377	11.772	-12.0%	13.4%
70	8.8064	10.017	11.376	-12.1%	13.6%
71	8.4934	9.6711	10.995	-12.2%	13.7%

72	8.1928	9.3386	10.628	-12.3%	13.8%
73	7.9040	9.0189	10.275	-12.4%	13.9%
74	7.6266	8.7114	9.9346	-12.5%	14.0%
75	7.3600	8.4156	9.6072	-12.5%	14.2%
76	7.1038	8.1310	9.2920	-12.6%	14.3%
77	6.8575	7.8572	8.9883	-12.7%	14.4%
78	6.6208	7.5938	8.6958	-12.8%	14.5%
79	6.3932	7.3401	8.4139	-12.9%	14.6%
80	6.1742	7.0960	8.1423	-13.0%	14.7%
81	5.9637	6.8609	7.8805	-13.1%	14.9%
82	5.7611	6.6346	7.6282	-13.2%	15.0%
83	5.5662	6.4165	7.3849	-13.3%	15.1%
84	5.3787	6.2065	7.1504	-13.3%	15.2%
85	5.1981	6.0042	6.9241	-13.4%	15.3%
86	5.0224	5.8092	6.7060	-13.5%	15.4%
87	4.8571	5.6214	6.4955	-13.6%	15.5%
88	4.6960	5.4403	6.2924	-13.7%	15.7%
89	4.5409	5.2657	6.0965	-13.8%	15.8%
90	4.3915	5.0974	5.9073	-13.8%	15.9%
91	4.2475	4.9351	5.7248	-13.9%	16.0%
92	4.1088	4.7786	5.5486	-14.0%	16.1%
93	3.9752	4.6276	5.3785	-14.1%	16.2%
94	3.8464	4.4820	5.2142	-14.2%	16.3%
95	3.7222	4.3414	5.0556	-14.3%	16.5%
96	3.6025	4.2058	4.9023	-14.3%	16.6%
97	3.4871	4.0750	4.7543	-14.4%	16.7%
98	3.3759	3.9487	4.61	-14.5%	16.8%
99	3.2685	3.8267	4.4731	-14.6%	16.9%
100	3.1650	3.7090	4.3395	-14.7%	17.0%
101	3.0651	3.5953	4.2105	-14.7%	17.1%
102	2.9688	3.4855	4.0857	-14.8%	17.2%
103	2.8758	3.3795	3.9650	-14.9%	17.3%
104	2.7860	3.2770	3.8484	-15.0%	17.4%
105	2.6994	3.1781	3.7356	-15.1%	17.5%
106	2.6158	3.0824	3.6265	-15.1%	17.7%
107	2.5350	2.9900	3.5210	-15.2%	17.8%
108	2.4571	2.9007	3.4189	-15.3%	17.9%
109	2.3818	2.8143	3.3202	-15.4%	18.0%
110	2.3090	2.7309	3.2246	-15.4%	18.1%
111	2.2388	2.6502	3.1321	-15.5%	18.2%
112	2.1709	2.5721	3.0426	-15.6%	18.3%
113	2.1053	2.4966	2.9560	-15.7%	18.4%
114	2.0419	2.4236	2.8721	-15.7%	18.5%
115	1.9807	2.3530	2.7909	-15.8%	18.6%
116	1.9215	2.2847	2.7122	-15.9%	18.7%
117	1.8642	2.2186	2.6361	-16.0%	18.8%
118	1.8089	2.1546	2.5623	-16.0%	18.9%
119	1.7554	2.0927	2.4909	-16.1%	19.0%
120	1.7036	2.0328	2.4216	-16.2%	19.1%

7.2.3 outdoor air sensor and outdoor pipe sensor

R(0)=15K±2% ;B(0/100)=3450K±2% R-T datasheet

Temp.(℃)	R(min) (KΩ)	R(cent) (KΩ)	R(max) (KΩ)	ΔR(min)	ΔR(max)

-40	106.800	113.500	120.500	-5.90%	6.17%
-39	101.000	107.200	113.700	-5.78%	6.06%
-38	95.600	101.300	107.400	-5.63%	6.02%
-37	90.430	95.760	101.400	-5.57%	5.89%
-36	85.610	90.550	95.740	-5.46%	5.73%
-35	81.070	85.660	90.470	-5.36%	5.62%
-34	76.800	81.060	85.510	-5.26%	5.49%
-33	72.780	76.730	80.860	-5.15%	5.38%
-32	68.990	72.650	76.480	-5.04%	5.27%
-31	65.420	68.820	72.370	-4.94%	5.16%
-30	62.060	65.210	68.500	-4.83%	5.05%
-29	58.890	61.810	64.860	-4.72%	4.93%
-28	55.890	58.610	61.430	-4.64%	4.81%
-27	53.070	55.590	58.210	-4.53%	4.71%
-26	50.410	52.750	55.170	-4.44%	4.59%
-25	47.890	50.060	52.310	-4.33%	4.49%
-24	45.520	47.530	49.610	-4.23%	4.38%
-23	43.270	45.140	47.070	-4.14%	4.28%
-22	41.150	42.890	44.670	-4.06%	4.15%
-21	39.150	40.760	42.410	-3.95%	4.05%
-20	37.260	38.740	40.280	-3.82%	3.98%
-19	35.460	36.840	38.260	-3.75%	3.85%
-18	33.770	35.050	36.360	-3.65%	3.74%
-17	32.160	33.350	34.560	-3.57%	3.63%
-16	30.640	31.740	32.860	-3.47%	3.53%
-15	29.200	30.220	31.260	-3.38%	3.44%
-14	27.840	28.780	29.740	-3.27%	3.34%
-13	26.550	27.420	28.310	-3.17%	3.25%
-12	25.330	26.130	26.950	-3.06%	3.14%
-11	24.170	24.910	25.670	-2.97%	3.05%
-10	23.070	23.75	24.450	-2.86%	2.95%
-9	22.020	22.66	23.300	-2.82%	2.82%
-8	21.030	21.62	22.210	-2.73%	2.73%
-7	20.090	20.63	21.180	-2.62%	2.67%
-6	19.200	19.7	20.200	-2.54%	2.54%
-5	18.350	18.81	19.270	-2.45%	2.45%
-4	17.540	17.97	18.390	-2.39%	2.34%
-3	16.780	17.17	17.560	-2.27%	2.27%
-2	16.050	16.41	16.770	-2.19%	2.19%
-1	15.360	15.69	16.010	-2.10%	2.04%
0	14.700	15	15.300	-2.00%	2.00%
1	14.050	14.35	14.650	-2.09%	2.09%
2	13.430	13.73	14.030	-2.18%	2.18%
3	12.840	13.14	13.440	-2.28%	2.28%
4	12.280	12.58	12.880	-2.38%	2.38%
5	11.750	12.05	12.340	-2.49%	2.41%
6	11.250	11.54	11.830	-2.51%	2.51%
7	10.770	11.05	11.340	-2.53%	2.62%
8	10.310	10.59	10.880	-2.64%	2.74%
9	9.876	10.16	10.440	-2.80%	2.76%
10	9.461	9.738	10.020	-2.84%	2.90%
11	9.067	9.340	9.617	-2.92%	2.97%
12	8.691	8.960	9.234	-3.00%	3.06%
13	8.333	8.598	8.868	-3.08%	3.14%

14	7.9920	8.253	8.519	-3.16%	3.22%
15	7.667	7.924	8.186	-3.24%	3.31%
16	7.357	7.609	7.867	-3.31%	3.39%
17	7.061	7.309	7.563	-3.39%	3.48%
18	6.778	7.023	7.273	-3.49%	3.56%
19	6.509	6.749	6.995	-3.56%	3.64%
20	6.252	6.487	6.729	-3.62%	3.73%
21	6.006	6.238	6.475	-3.72%	3.80%
22	5.772	5.999	6.232	-3.78%	3.88%
23	5.548	5.770	5.999	-3.85%	3.97%
24	5.334	5.552	5.777	-3.93%	4.05%
25	5.130	5.343	5.564	-3.99%	4.14%
26	4.934	5.144	5.360	-4.08%	4.20%
27	4.747	4.952	5.165	-4.14%	4.30%
28	4.568	4.769	4.978	-4.21%	4.38%
29	4.397	4.594	4.798	-4.29%	4.44%
30	4.233	4.426	4.627	-4.36%	4.54%
31	4.077	4.266	4.462	-4.43%	4.59%
32	3.927	4.112	4.304	-4.50%	4.67%
33	3.783	3.964	4.153	-4.57%	4.77%
34	3.645	3.823	4.007	-4.66%	4.81%
35	3.513	3.687	3.868	-4.72%	4.91%
36	3.387	3.557	3.734	-4.78%	4.98%
37	3.266	3.432	3.606	-4.84%	5.07%
38	3.150	3.313	3.483	-4.92%	5.13%
39	3.038	3.198	3.364	-5.00%	5.19%
40	2.932	3.088	3.250	-5.05%	5.25%
41	2.829	2.982	3.141	-5.13%	5.33%
42	2.731	2.880	3.036	-5.17%	5.42%
43	2.636	2.782	2.935	-5.25%	5.50%
44	2.546	2.689	2.838	-5.32%	5.54%
45	2.459	2.599	2.745	-5.39%	5.62%
46	2.375	2.512	2.655	-5.45%	5.69%
47	2.295	2.429	2.569	-5.52%	5.76%
48	2.218	2.349	2.486	-5.58%	5.83%
49	2.1440	2.2720	2.4060	-5.63%	5.90%
50	2.0720	2.1970	2.3290	-5.69%	6.01%
51	2.0040	2.1260	2.2550	-5.74%	6.07%
52	1.9380	2.0580	2.1840	-5.83%	6.12%
53	1.8750	1.9920	2.1150	-5.87%	6.17%
54	1.8140	1.9280	2.0490	-5.91%	6.28%
55	1.7550	1.8670	1.9850	-6.00%	6.32%
56	1.6980	1.8080	1.9240	-6.08%	6.42%
57	1.6440	1.7510	1.8650	-6.11%	6.51%
58	1.5920	1.6960	1.8070	-6.13%	6.54%
59	1.5410	1.6440	1.7520	-6.27%	6.57%
60	1.4930	1.5930	1.6990	-6.28%	6.65%
61	1.4460	1.5440	1.6480	-6.35%	6.74%
62	1.4010	1.4970	1.5990	-6.41%	6.81%
63	1.3570	1.4510	1.5510	-6.48%	6.89%
64	1.3150	1.4070	1.5050	-6.54%	6.97%
65	1.2750	1.3650	1.4600	-6.59%	6.96%
66	1.2360	1.3240	1.4170	-6.65%	7.02%

67	1.1980	1.2840	1.3760	-6.70%	7.17%
68	1.1620	1.2460	1.3360	-6.74%	7.22%
69	1.1270	1.2090	1.2970	-6.78%	7.28%
70	1.0930	1.1740	1.2600	-6.90%	7.33%
71	1.0600	1.1390	1.2240	-6.94%	7.46%
72	1.0290	1.1060	1.1890	-6.96%	7.50%
73	0.9985	1.0740	1.1550	-7.03%	7.54%
74	0.9691	1.0430	1.1220	-7.09%	7.57%
75	0.9407	1.0130	1.0910	-7.14%	7.70%
76	0.9133	0.9841	1.0600	-7.19%	7.71%
77	0.8868	0.9561	1.0300	-7.25%	7.73%
78	0.8612	0.9290	1.0020	-7.30%	7.86%
79	0.8364	0.9028	0.9741	-7.35%	7.90%
80	0.8124	0.8773	0.9473	-7.40%	7.98%
81	0.7893	0.8529	0.9213	-7.46%	8.02%
82	0.7669	0.8292	0.8962	-7.51%	8.08%
83	0.7452	0.8062	0.8718	-7.57%	8.14%
84	0.7242	0.7839	0.8482	-7.62%	8.20%
85	0.7039	0.7624	0.8254	-7.67%	8.26%
86	0.6842	0.7415	0.8032	-7.73%	8.32%
87	0.6652	0.7213	0.7817	-7.78%	8.37%
88	0.6468	0.7017	0.7609	-7.82%	8.44%
89	0.6290	0.6827	0.7407	-7.87%	8.50%
90	0.6117	0.6643	0.7212	-7.92%	8.57%
91	0.5949	0.6465	0.7022	-7.98%	8.62%
92	0.5787	0.6292	0.6838	-8.03%	8.68%
93	0.5630	0.6124	0.6660	-8.07%	8.75%
94	0.5478	0.5962	0.6486	-8.12%	8.79%
95	0.5330	0.5804	0.6318	-8.17%	8.86%
96	0.5187	0.5651	0.6155	-8.21%	8.92%
97	0.5048	0.5503	0.5997	-8.27%	8.98%
98	0.4913	0.5359	0.5843	-8.32%	9.03%
99	0.4783	0.5219	0.5694	-8.35%	9.10%
100	0.4656	0.5084	0.5549	-8.42%	9.15%
101	0.4533	0.4952	0.5408	-8.46%	9.21%
102	0.4414	0.4824	0.5271	-8.50%	9.27%
103	0.4298	0.4700	0.5138	-8.55%	9.32%
104	0.4186	0.4580	0.5009	-8.60%	9.37%
105	0.4077	0.4463	0.4883	-8.65%	9.41%
106	0.3971	0.4349	0.4761	-8.69%	9.47%
107	0.3868	0.4238	0.4643	-8.73%	9.56%
108	0.3768	0.4131	0.4527	-8.79%	9.59%
109	0.3671	0.4027	0.4415	-8.84%	9.63%
110	0.3576	0.3925	0.4306	-8.89%	9.71%
111	0.3485	0.3826	0.4200	-8.91%	9.78%
112	0.3396	0.3731	0.4097	-8.98%	9.81%
113	0.3309	0.3637	0.3997	-9.02%	9.90%
114	0.3225	0.3547	0.3899	-9.08%	9.92%
115	0.3143	0.3458	0.3804	-9.11%	10.01%
116	0.3063	0.3373	0.3711	-9.19%	10.02%
117	0.2986	0.3289	0.3621	-9.21%	10.09%
118	0.2911	0.3208	0.3533	-9.26%	10.13%

119	0.2838	0.3129	0.3448	-9.30%	10.19%
120	0.2767	0.3052	0.3365	-9.34%	10.26%

7.2.4 outdoor discharge pipe R(0)=187.25K±6.3% ;B(0/100)=3979K±1% R-T datasheet

Temp.(℃)	R(min) (KΩ)	R(cent) (KΩ)	R(max) (KΩ)	ΔR(min)	ΔR(max)
-20	488.35	526.61	565.60	-7.3%	7.4%
-19	461.94	497.84	534.41	-7.2%	7.3%
-18	437.15	470.87	505.17	-7.2%	7.3%
-17	413.89	445.57	477.76	-7.1%	7.2%
-16	392.05	421.83	462.06	-7.1%	9.5%
-15	371.54	399.54	427.94	-7.0%	7.1%
-14	352.27	378.61	405.31	-7.0%	7.1%
-13	334.16	358.96	384.06	-6.9%	7.0%
-12	317.13	340.48	364.10	-6.9%	6.9%
-11	301.11	323.11	345.34	-6.8%	6.9%
-10	286.03	306.77	327.71	-6.8%	6.8%
-9	271.83	291.40	311.13	-6.7%	6.8%
-8	258.46	276.92	295.52	-6.7%	6.7%
-7	245.86	263.29	280.83	-6.6%	6.7%
-6	233.98	250.44	266.99	-6.6%	6.6%
-5	222.78	238.33	253.96	-6.5%	6.6%
-4	212.20	226.91	241.67	-6.5%	6.5%
-3	202.22	216.13	230.07	-6.4%	6.4%
-2	192.79	205.95	219.13	-6.4%	6.4%
-1	183.88	196.34	208.80	-6.3%	6.3%
0	175.45	187.25	199.05	-6.3%	6.3%
1	167.33	178.66	190.00	-6.3%	6.3%
2	159.64	170.53	181.45	-6.4%	6.4%
3	152.37	162.84	173.34	-6.4%	6.4%
4	145.49	155.56	165.67	-6.5%	6.5%
5	138.97	148.66	158.39	-6.5%	6.5%
6	132.80	142.12	151.49	-6.6%	6.6%
7	126.95	135.92	144.94	-6.6%	6.6%
8	121.40	130.03	138.73	-6.6%	6.7%
9	116.13	124.45	132.83	-6.7%	6.7%
10	111.13	119.14	127.22	-6.7%	6.8%
11	106.38	114.10	121.89	-6.8%	6.8%
12	101.87	109.31	116.82	-6.8%	6.9%
13	97.585	104.75	112.00	-6.8%	6.9%
14	93.506	100.42	107.41	-6.9%	7.0%
15	89.625	96.289	103.04	-6.9%	7.0%
16	85.930	92.358	98.873	-7.0%	7.1%
17	82.411	88.612	94.902	-7.0%	7.1%
18	79.058	85.042	91.116	-7.0%	7.1%
19	75.861	81.637	87.503	-7.1%	7.2%
20	72.813	78.388	84.055	-7.1%	7.2%
21	69.904	75.287	80.768	-7.1%	7.3%
22	67.128	72.326	77.618	-7.2%	7.3%
23	64.477	69.498	74.612	-7.2%	7.4%
24	61.945	66.795	71.738	-7.3%	7.4%
25	59.525	64.210	68.990	-7.3%	7.4%
26	57.211	61.739	66.360	-7.3%	7.5%
27	54.998	59.373	63.843	-7.4%	7.5%

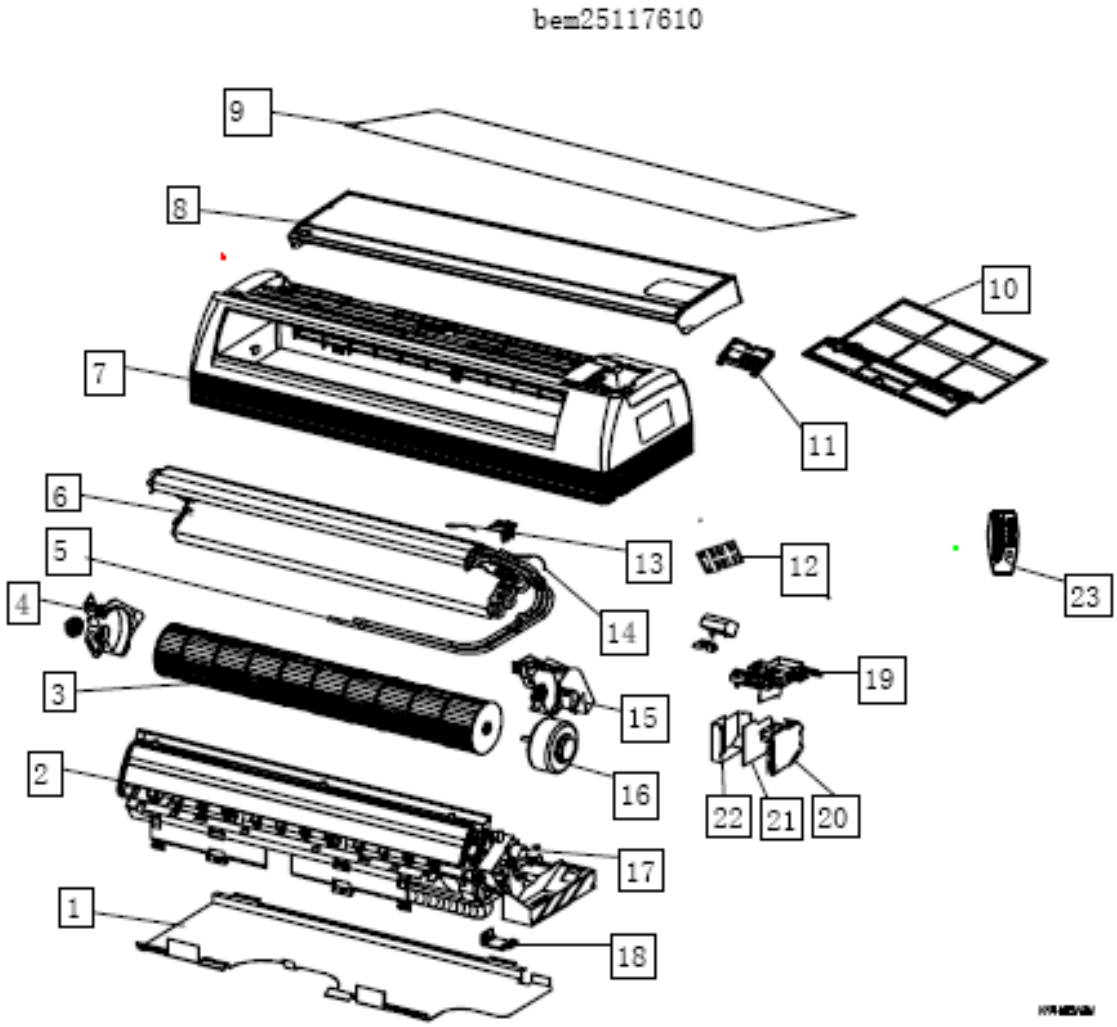
28	52.880	57.110	61.433	-7.4%	7.6%
29	50.853	54.942	59.124	-7.4%	7.6%
30	48.913	52.866	56.911	-7.5%	7.7%
31	47.054	50.876	54.791	-7.5%	7.7%
32	45.273	48.939	52.757	-7.5%	7.8%
33	43.565	47.140	50.806	-7.6%	7.8%
34	41.928	45.386	48.934	-7.6%	7.8%
35	40.358	43.703	47.137	-7.7%	7.9%
36	38.852	42.087	45.412	-7.7%	7.9%
37	37.408	40.536	43.755	-7.7%	7.9%
38	36.018	39.047	42.163	-7.8%	8.0%
39	34.685	37.616	40.632	-7.8%	8.0%
40	33.404	36.240	39.162	-7.8%	8.1%
41	32.174	34.919	37.747	-7.9%	8.1%
42	30.991	33.648	36.387	-7.9%	8.1%
43	29.855	32.426	35.078	-7.9%	8.2%
44	28.761	31.250	33.819	-8.0%	8.2%
45	27.710	30.119	32.606	-8.0%	8.3%
46	26.699	29.030	31.439	-8.0%	8.3%
47	25.725	27.982	30.315	-8.1%	8.3%
48	24.788	26.973	29.233	-8.1%	8.4%
49	23.887	26.001	28.190	-8.1%	8.4%
50	23.018	25.065	27.185	-8.2%	8.5%
51	22.182	24.163	26.217	-8.2%	8.5%
52	21.377	23.295	25.284	-8.2%	8.5%
53	20.601	22.457	24.384	-8.3%	8.6%
54	19.854	21.650	23.516	-8.3%	8.6%
55	19.133	20.873	22.680	-8.3%	8.7%
56	18.439	20.123	21.873	-8.4%	8.7%
57	17.770	19.399	21.094	-8.4%	8.7%
58	17.125	18.702	20.343	-8.4%	8.8%
59	16.503	18.029	19.618	-8.5%	8.8%
60	15.903	17.380	18.920	-8.5%	8.9%
61	15.324	16.754	18.245	-8.5%	8.9%
62	14.766	16.150	17.594	-8.6%	8.9%
63	14.228	15.568	16.965	-8.6%	9.0%
64	13.709	15.005	16.358	-8.6%	9.0%
65	13.209	14.463	15.772	-8.7%	9.1%
66	12.726	13.939	15.207	-8.7%	9.1%
67	12.260	13.433	14.681	-8.7%	9.3%
68	11.810	12.946	14.134	-8.8%	9.2%
69	11.376	12.475	13.650	-8.8%	9.4%
70	10.958	12.020	13.133	-8.8%	9.3%
71	10.554	11.581	12.658	-8.9%	9.3%
72	10.164	11.158	12.200	-8.9%	9.3%
73	9.7880	10.749	11.757	-8.9%	9.4%
74	9.4251	10.354	11.330	-9.0%	9.4%
75	9.0749	9.9733	10.917	-9.0%	9.5%
76	8.7370	9.6055	10.518	-9.0%	9.5%
77	8.4109	9.2505	10.134	-9.1%	9.6%
78	8.0962	8.9078	9.7618	-9.1%	9.6%
79	7.7926	8.5770	9.4028	-9.1%	9.6%
80	7.4997	8.2577	9.0562	-9.2%	9.7%

81	7.2170	7.9495	8.7215	-9.2%	9.7%
82	6.9443	7.6520	8.3983	-9.2%	9.8%
83	6.6812	7.3649	8.0883	-9.3%	9.8%
84	6.4273	7.0878	7.7850	-9.3%	9.8%
85	6.1825	6.8204	7.4942	-9.4%	9.9%
86	5.9462	6.5623	7.2135	-9.4%	9.9%
87	5.7184	6.3133	6.9424	-9.4%	10.0%
88	5.4987	6.0731	6.6808	-9.5%	10.0%
89	5.2867	5.8413	6.4284	-9.5%	10.1%
90	5.0827	5.6177	6.1847	-9.5%	10.1%
91	4.8853	5.4018	5.9495	-9.6%	10.1%
92	4.6953	5.1939	5.7226	-9.6%	10.2%
93	4.5121	4.9932	5.5037	-9.6%	10.2%
94	4.3355	4.7997	5.2925	-9.7%	10.3%
95	4.1653	4.6131	5.0840	-9.7%	10.2%
96	4.0012	4.4331	4.8922	-9.7%	10.4%
97	3.8431	4.2596	4.7026	-9.8%	10.4%
98	3.6908	4.0924	4.5198	-9.8%	10.4%
99	3.5440	3.9312	4.3435	-9.8%	10.5%
100	3.4025	3.7759	4.1735	-9.9%	10.5%
101	3.2663	3.6262	4.0097	-9.9%	10.6%
102	3.1351	3.4819	3.8517	-10.0%	10.6%
103	3.0087	3.3429	3.6995	-10.0%	10.7%
104	2.8870	3.2090	3.5528	-10.0%	10.7%
105	2.7699	3.0801	3.4114	-10.1%	10.8%
106	2.6571	2.9559	3.2720	-10.1%	10.7%
107	2.5485	2.8363	3.1440	-10.1%	10.8%
108	2.4441	2.7211	3.0176	-10.2%	10.9%
109	2.3435	2.6103	2.8959	-10.2%	10.9%
110	2.2468	2.5036	2.7787	-10.3%	11.0%
111	2.1537	2.4009	2.6658	-10.3%	11.0%
112	2.0642	2.3021	2.5572	-10.3%	11.1%
113	1.9781	2.2070	2.4526	-10.4%	11.1%
114	1.8954	2.1155	2.3519	-10.4%	11.2%
115	1.8158	2.0276	2.2551	-10.4%	11.2%
116	1.7393	1.9430	2.1619	-10.5%	11.3%
117	1.6657	1.8616	2.0723	-10.5%	11.3%
118	1.5951	1.7834	1.9861	-10.6%	11.4%
119	1.5272	1.7082	1.9032	-10.6%	11.4%
120	1.4619	1.6359	1.8234	-10.6%	11.5%

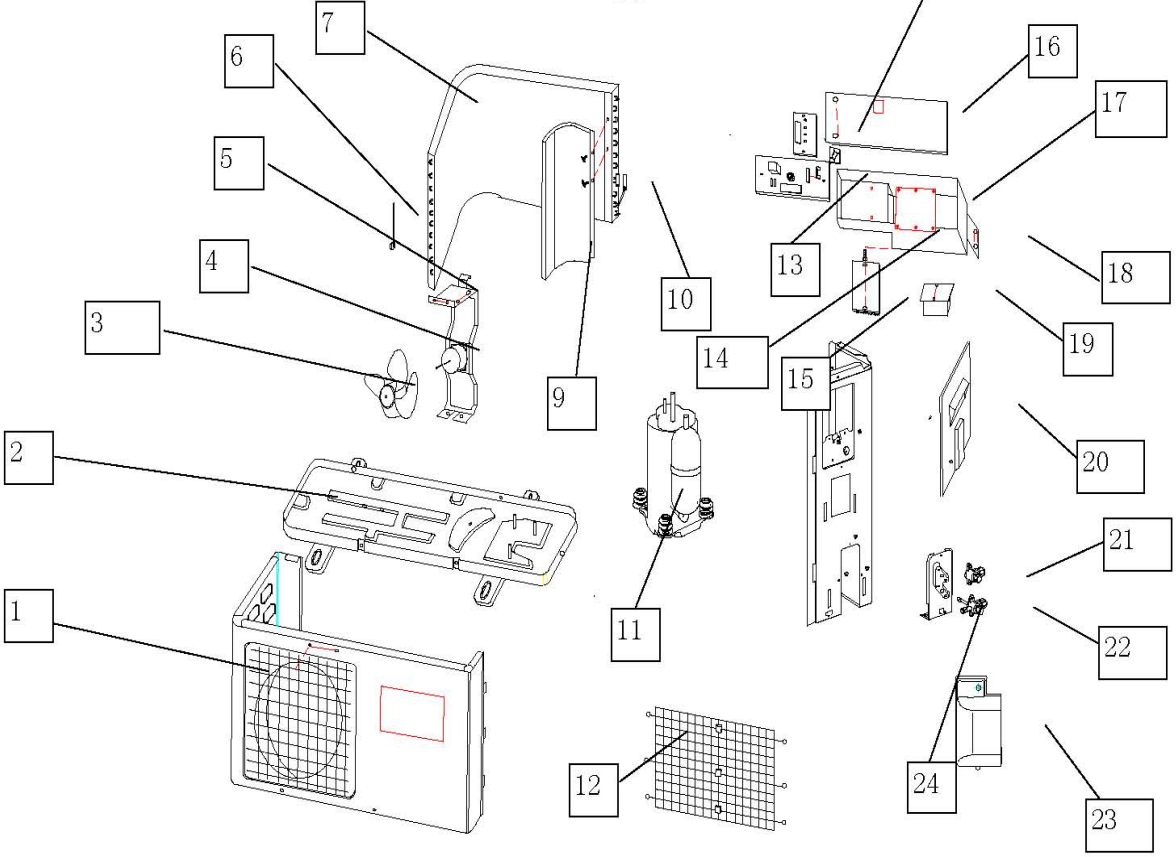
8. Parts List and exploding view

Exploding view and part list of KFR-25GWZ/BM

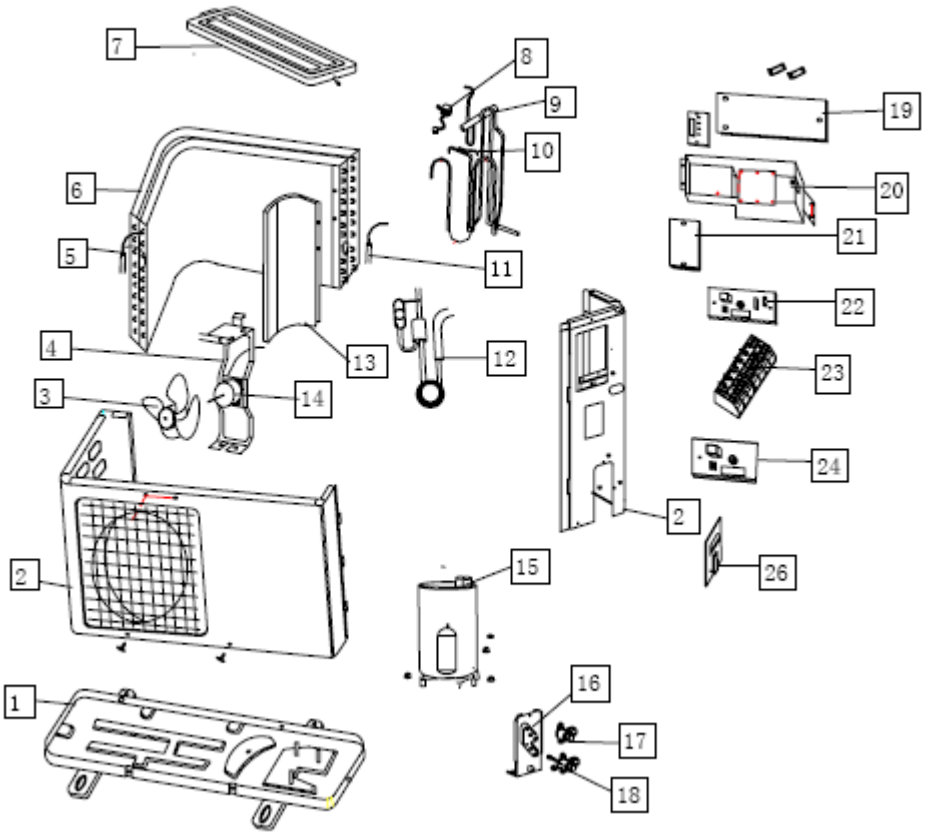
Indoor unit



No.	Part Name	Quantity	BOM code
1	Wall Mounted Board	1	e18503
2	Chassis Assembly	1	e535123
3	Cross Fan	1	e19294
4	Left Axial Cover	1	e19257
5	Evaporator Pipe	1	e20747
6	Evaporator	1	eQ00138
7	Frame Assembly	1	e19297
8	Frame	1	7 include 8
9	PVC	1	eb38637
10	Filter	1	7 include 10
11	Display board Assembly	1	e50543



bem25127610

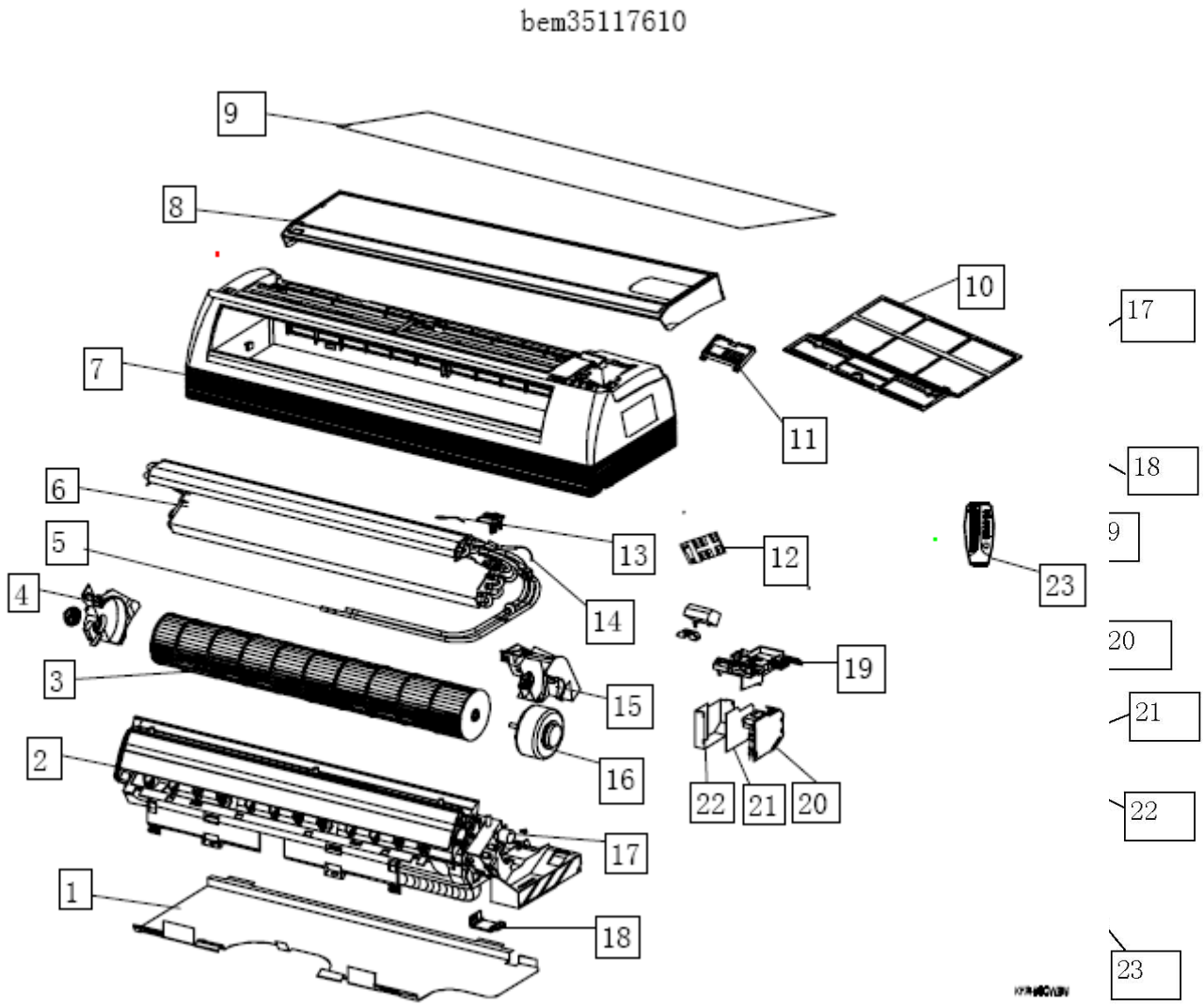


No.	Part Name	Quantity	BOM code
1	Front Frame Assembly	1	e30640/e30641
2	Chassis Assembly	1	e30851/e30852

3	Axial Fan	1	eb38658
4	Motor Bracket	1	e30206
5	Outdoor Air Sensor	1	eb11667
6	Condenser	1	eQ00136
7	Top Cover	1	e14335/e14336
8	4-way valve winding	1	eb40103
9	4-way valve	1	eb40090
10	discharge sensor	1	eb11664
11	pipe sensor	1	eb11667
12	Capillary assembly	1	e20603
13	middle clipboard	1	e15607
14	outdoor motor	1	eb61530
15	compressor	1	eb15582
16	valve board	1	e14339/e14340
17	high pressure valve	1	eb40092
18	low pressure valve	1	eb40093
19	electric controlling box cover	1	e30745
20	electric controlling box	1	e30639
21	Fin	1	e30702
22	outdoor driver board	1	e52138
23	Outdoor terminal block	1	eb35154/eb35153
24	outdoor PFC board	1	e52137
25	Right Side Panel	1	e30644/e30645
26	big handle	1	e14219

Exploding view and part list of KFR-35GWZ/BM

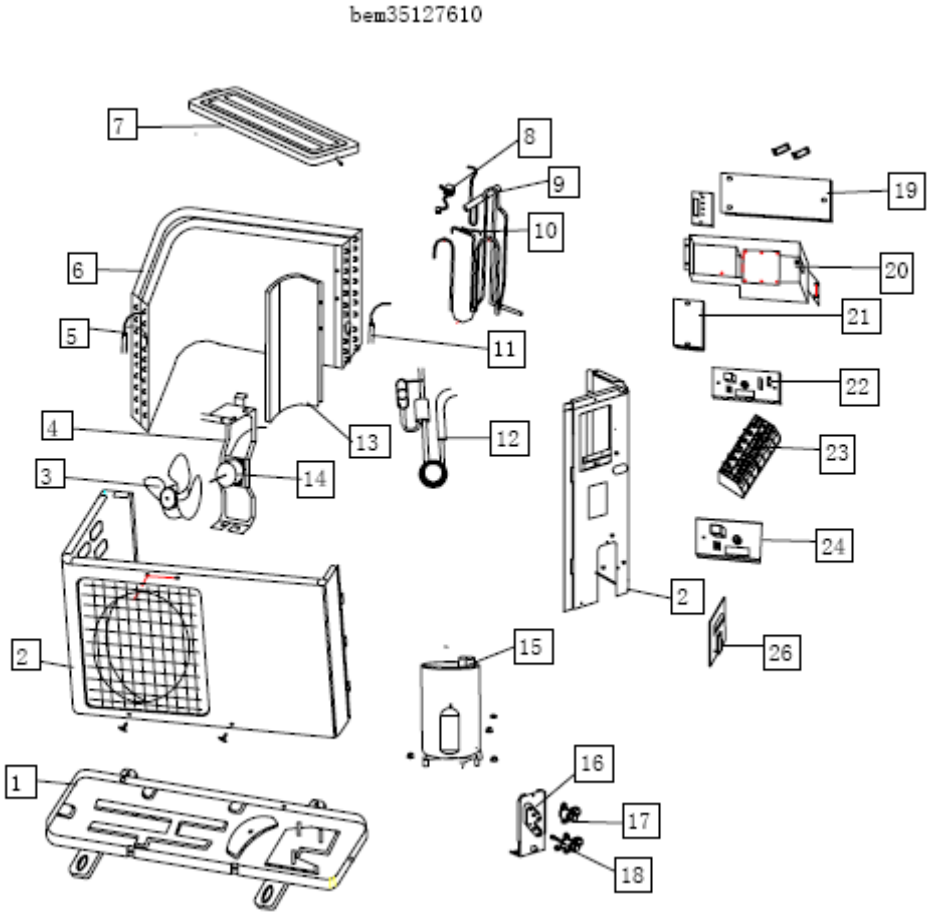
Indoor unit



No.	Part Name	Quantity	BOM code
1	Wall Mounted Board	1	e18503
2	Chassis Assembly	1	e535123
3	Cross Fan	1	e19294
4	Left Axial Cover	1	e19257
5	Evaporator Pipe	1	e20748
6	Evaporator	1	eQ00138
7	Frame Assembly	1	e19297
8	Frame	1	7 include 8
9	PVC	1	eb38637
10	Filter	1	7 include 10
11	Display board Assembly	1	e50543

12	Indoor terminal block	1	eb35153
13	Air Sensor	1	eb11665
14	Pipe sensor	1	eb11666
15	Motor Cover	1	e19258
16	Indoor Motor	1	eb38560
17	Step Motor	1	eb60073
18	Copper Pipe Clip	1	e19256
19	Electric Controlling box Up Cover	1	e19296
20	Indoor Controlling Board	1	e52125
21	Electric Controlling box soleplate	1	e19295
22	Electric Controlling box	1	e18499
23	Remote Controller	1	eb85093

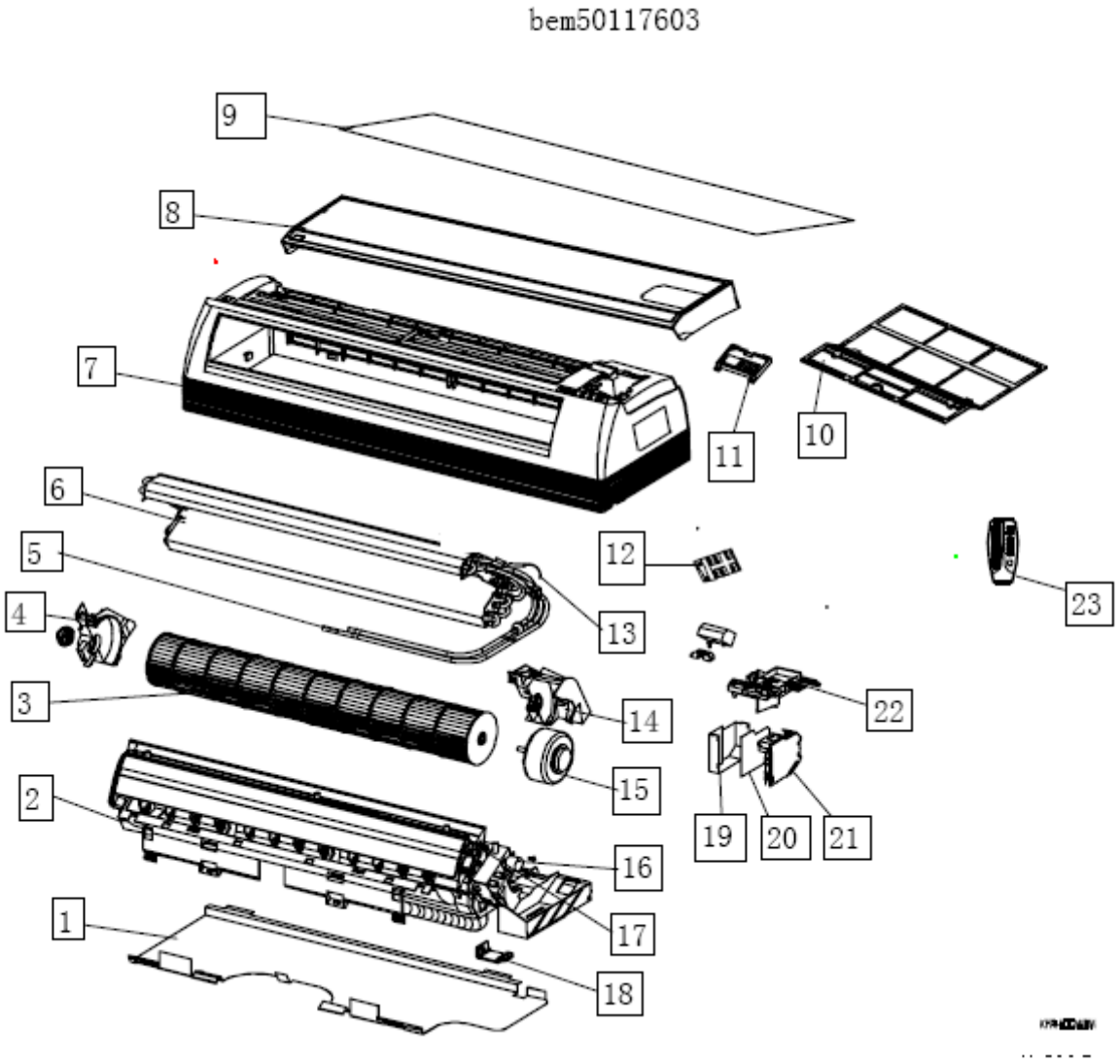
Outdoor unit



No.	Part Name	Quantity	BOM code
1	Chassis Assembly	1	e30640/e30641
2	Front Frame Assembly	1	e14598/e14599
3	Axial Fan	1	eb38658
4	Motor Bracket	1	e30308
5	Outdoor Air Sensor	1	eb11667
6	Condenser	1	eQ00137
7	Top Cover	1	e14335/e14336
8	4-way valve winding	1	eb40103
9	4-way valve	1	eb40094
10	discharge sensor	1	eb11664
11	pipe sensor	1	eb11667
12	Capillary assembly	1	e20617
13	middle clipboard	1	e15607
14	outdoor motor	1	eb61530
15	compressor	1	eb15599
16	valve board	1	e14339/e14340
17	high pressure valve	1	eb40092
18	low pressure valve	1	eb40096
19	electric controlling box cover	1	e30745
20	electric controlling box	1	e30639
21	Fin	1	e30702
22	outdoor driver board	1	e52138
23	Outdoor terminal block	1	eb35154/eb35153
24	outdoor PFC board	1	e52137
25	Right Side Panel	1	e30644/e30645
26	big handle	1	e19306

8.3 Exploding view and part list of KFR-50GWZ/BM

Indoor unit

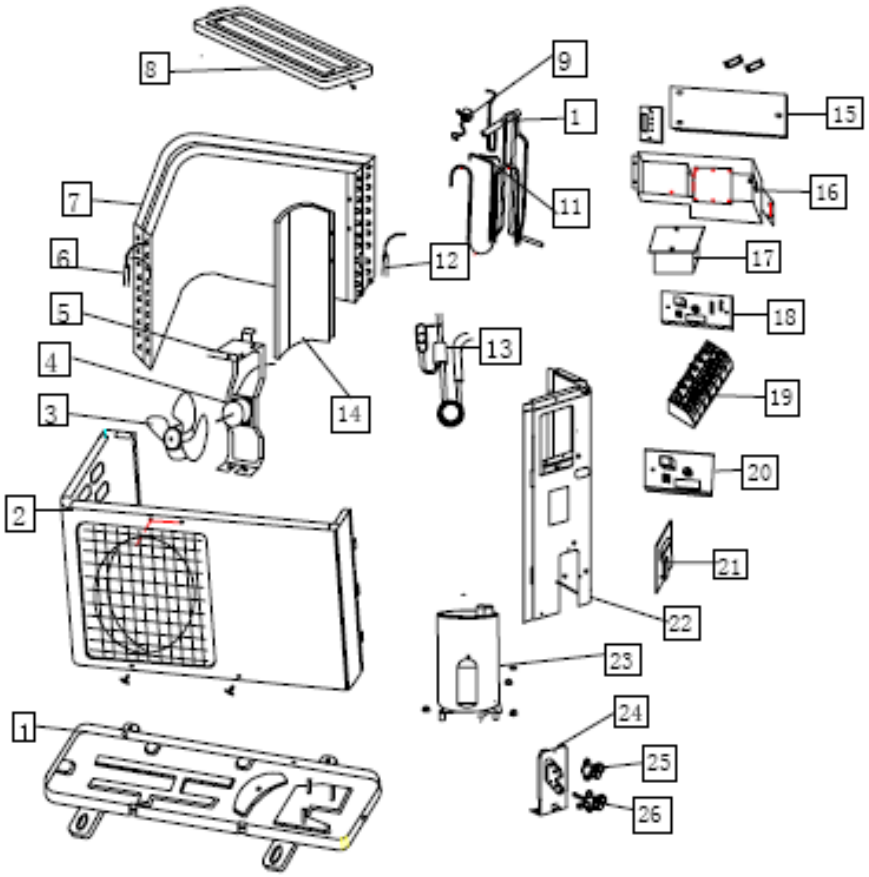


No.	Part Name	Quantity	BOM code
1	Wall Mounted Board	1	e17978
2	Chassis Assembly	1	e19341
3	Cross Fan	1	eb38669
4	Left Axial Cover	1	e17980
5	Evaporator Pipe	1	e20509
6	Evaporator	1	eQ00139
7	Frame Assembly	1	e19340
8	Frame	1	7 include 8
9	PVC	1	e19383

10	Filter	1	e17989
11	Display board Assembly	1	e50543
12	Indoor terminal block	1	eb35153
13	Air Sensor	1	eb10007
14	Motor Cover	1	e17982
15	Indoor Motor	1	eb38668
16	Step Motor	1	eb38162
17	Flume	1	e19342
18	Copper Pipe Clip	1	e17987
19	Electric Controlling box	1	e30706
20	Electric Controlling box soleplate	1	e19343
21	Indoor Controlling Board	1	e50613
22	Electric Controlling box top Cover	1	e30707
23	Remote Controller	1	eb85093

Outdoor unit

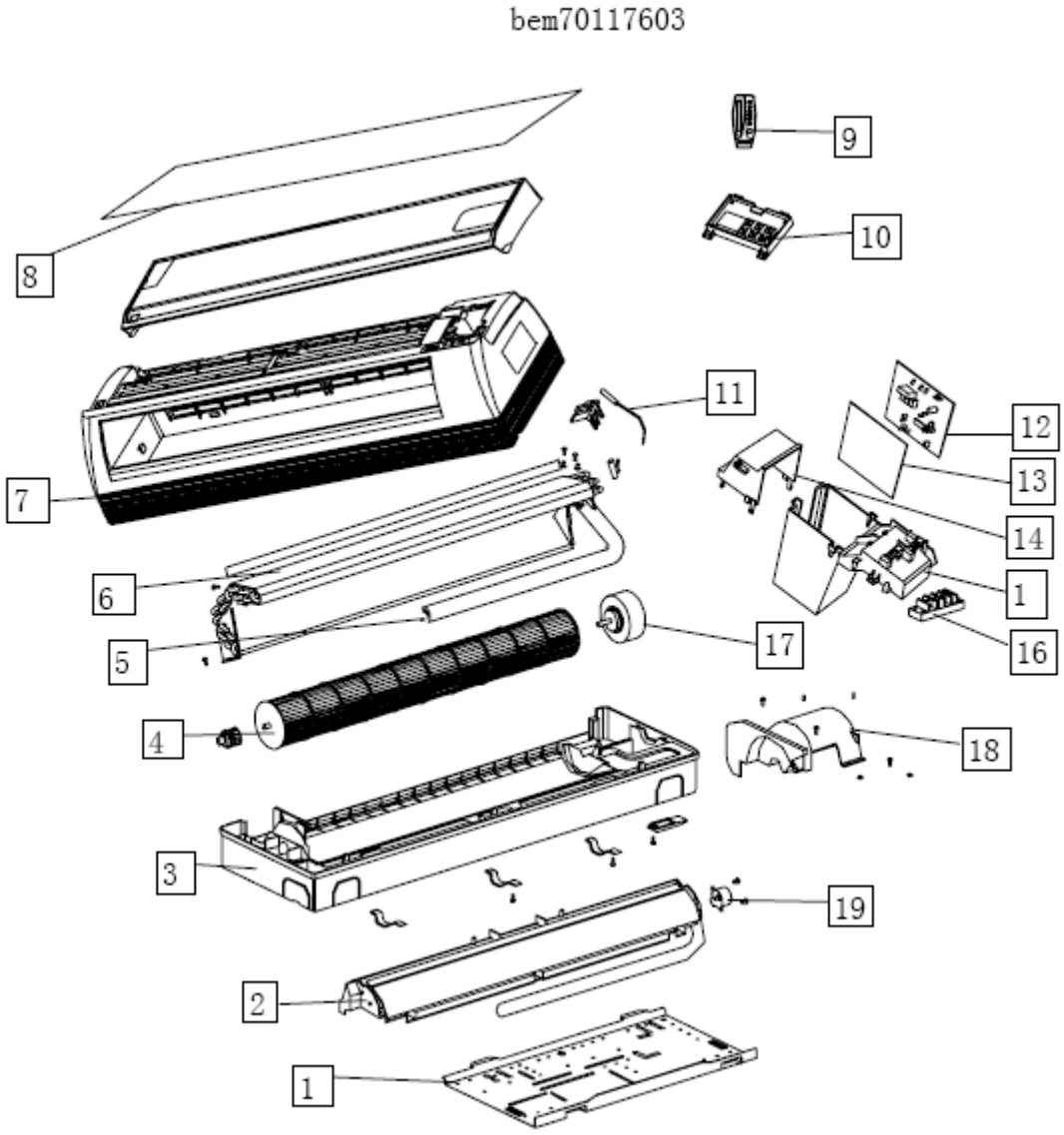
bem50127603



No.	Part Name	Quantity	BOM code
1	Chassis Assembly	1	e30708/e30709
2	Front Frame Assembly	1	e30741/e30742
3	Axial Fan	1	eb38670
5	Motor Bracket	1	e30684
6	Outdoor Air Sensor	1	eb10011
7	Condenser	1	eQ00140
8	Top Cover	1	e30680/e30681
9	4-way valve winding	1	eb40103
10	4-way valve	1	eb40094
11	discharge sensor	1	eb11664
12	pipe sensor	1	eb11660
13	Capillary assembly	1	e22179
14	middle clipboard	1	e30679
4	outdoor motor	1	eb61531
23	compressor	1	eb15656
24	valve board	1	e30749/e30750
26	high pressure valve	1	eb40092
25	low pressure valve	1	eb40137
15	electric controlling box cover	1	e30683
16	electric controlling box	1	e30682
17	High-frequency inductance	1	eb38674
18	outdoor driver board	1	e50615
19	Outdoor terminal block	1	eb35154
20	outdoor power board	1	e50614
22	Right Side Panel	1	e30710/e30711
21	big handle	1	e19306

Exploding view and part list of KFR-70GWZ/BM

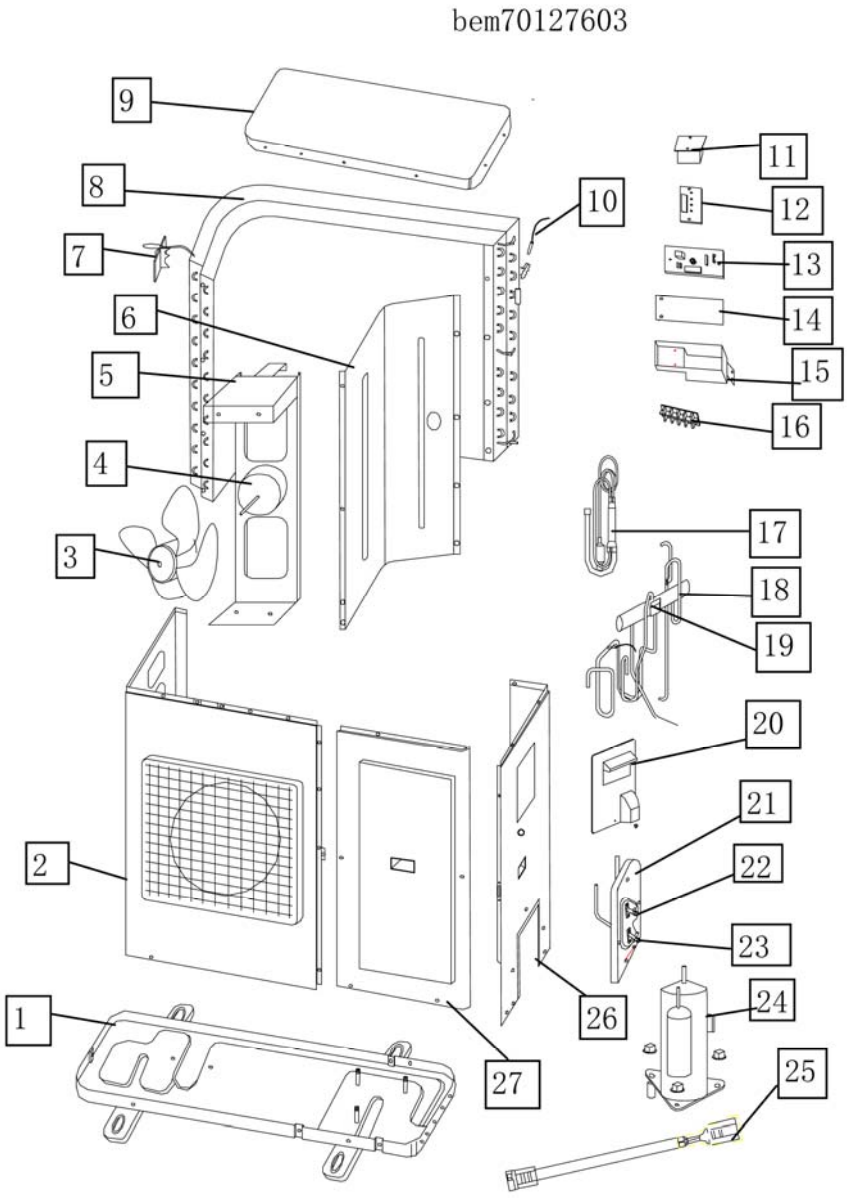
Indoor unit



No.	Part Name	Quantity	BOM code
1	Wall Mounted Board	1	e18416
2	Air outlet vent assembly	1	e535126
3	Chassis Assembly	1	e19326
4	Cross Fan	1	eb38667
5	indoor connect pipe 1/2	1	e20442/e18771
6	Evaporator	1	eQ00141
7	Part Name	1	e19328
8	PVC	1	e19384

9	Remote Controller	1	eb85093
10	Display board Assembly	1	e50543
11	Air Sensor	1	eb10007
12	Indoor Controlling Board	1	e50610
13	Indoor power Board	1	e50609
14	Electric Controlling box top Cover	1	e19325
15	Electric Controlling box	1	e19324
16	Indoor terminal block	1	e35153
17	Indoor Motor	1	eb61535
18	Indoor Motor cover	1	e19339
19	Step Motor	1	eb38229

Outdoor unit



No.	Part Name	Quantity	BOM code
1	Chassis Assembly	1	e30478/e30479
2	Front Frame Assembly	1	e30693/e30694
3	Axial Fan	1	eb38666
4	Outdoor motor	1	eb61532
5	Motor Bracket	1	e30512
6	middle clipboard	1	e19166
7	outdoor air sensor	1	eb10011
8	Condenser	1	eQ00142
9	Top Cover	1	e15838/e15839
10	outdoor pipe sensor	1	eb11660
11	High-frequency inductance	1	eb38676
12	outdoor power board	1	e50611
13	outdoor driver board	1	e50612
14	electric controlling box cover	1	e30252
15	electric controlling box	1	e30697
16	Outdoor terminal block	1	eb35156
17	Capillary assembly	1	e22092
18	4-way valve	1	eb40741
19	4-way valve winding	1	eb40742
20	big handle	1	e14219
21	valve board	1	e15831/e15832
22	low pressure valve	1	e40719
23	high pressure valve	1	e40718
24	compressor	1	eb15630
25	indoor to outdoor connect pipe	2	e21093/e21094
26	Right Side Panel	1	e30695/e30696
27	Right Frame Panel	1	e15835/e30494

Part II

1. Service warning

Part I General Warnings

1、The service person should wear safety belt if working more than 2.5m above the ground.

2、If working above ground level, measures should be adopted to prevent the outdoor unit or tools from falling and causing injuries or damage.

3、Check the customers power supply before testing the unit.

4、The power supply should be switched OFF when disassembling the casing and electrical components.

5、Take care to prevent a frost bite injury when charging with refrigerant.

6、Do not over pressurize the Freon cylinder. The over exposure, high temperature or dropping the cylinder should be avoided, otherwise, it could cause an explosion.

7、If there is need to pressure test the system, Dry Nitrogen should be used.

Part II Warnings of repair operation

1、 The high capacity electrolytic capacitor is used in the electric control cabinet of the outdoor unit. Even if the power plug is unplugged; this capacitor will retain a residual charge for a certain time. In order to avoid electric shock, please do not touch the control board as soon as the power is switched OFF. If it is necessary to change the control board of the outdoor unit, please switch OFF the power supply first. After the light emitting diode of outdoor control board extinguishes or the power is switched OFF for >30 sec's, let the high capacity capacitor discharges fully. The replacement can only be conducted after checking the high capacity capacitor has discharged fully with an electrical meter.

2、 After making use of self-diagnosis of faults on the site, switch the snap switch to "demonstrate", re-electrify the air-conditioner so that the system can erase the stored fault information of former self-diagnosis. Switch the snap switch to "ON" again, prepare for re-starting the air-conditioner. Because the LS-LT1508V model air-conditioner has not been fitted with an E^2PROM (storage device of fault information), the fault information will be automatically erased after switching OFF the power.

3、 For diagnosis of the system fault, first it is suggested to check whether the electrical wiring is reliable and correct. After eliminating this cause, continue to seek other causes.

2. Frequency table

	F0	F1	F2	F3	F4	F5	F6	F7	F8	F9	F10
KFR-25GWZ/BM COOLING	0	30	35	40	45	52	55	58	66	69	73
KFR-25GWZ/BM HEATING	0	30	35	40	45	52	55	59	66	69	73
KFR-35GWZ/BM COOLING	0	30	36	42	48	54	61	66	72	78	84
KFR-35GWZ/BM HEATING	0	30	36	42	48	54	61	66	72	78	84
KFR-50GWZ/BM COOLING	0	30	36	43	49	56	64	72	77	82	87
KFR-50GWZ/BM HEATING	0	30	36	43	49	58	67	77	81	84	87
KFR-70GWZ/BM COOLING	0	30	34	39	44	48	52	57	62	67	72
KFR-70GWZ/BM HEATING	0	30	35	40	46	51	56	62	67	73	78

3. Method of Testing the System at a Fixed Frequency

<table>
<tr><td>Cooling Capacity(MIDDLE FREQUENCY)</td><td>Cooling rated capacity</td><td>Heating Capacity(MIDDLE FREQUENCY)</td><td>Heat rated capacity</td></tr>
<tr><td colspan="4">1. Start the air conditioner</td></tr>
<tr><td colspan="4">2.Operate remote controller as following</td></tr>
<tr><td>Mode : Cool mode
Set temp. : 18℃
indoor fan : high</td><td>Mode : Cool mode
Set temp. : 16℃
indoor fan : high</td><td>Mode : heat mode
Set temp. : 28℃
indoor fan : high</td><td>Mode : heat mode
Set temp. : 30℃
indoor fan : high</td></tr>
<tr><td colspan="4">Press ‘powerful’ button 5 times with 10 seconds.</td></tr>
</table>

4. Running mode

4.1. Defrosting

1. Entry condition:

Defrosting starts when meeting one of the following conditions

a. The temperature of outdoor heat exchanger remains consecutively lower than 3°c for more than 40 minutes, and the temperature remains consecutively -6°c for more than 3 minutes

b. The temperature of outdoor heat exchanger remains consecutively lower than 3°c for more than 80 minutes, and the temperature remains consecutively -4°c for more than 3 minutes

c. The temperature of outdoor heat exchanger remains consecutively lower than 3°c for more than 120 minutes, and the temperature remains consecutively -3°c for more than 3 minutes

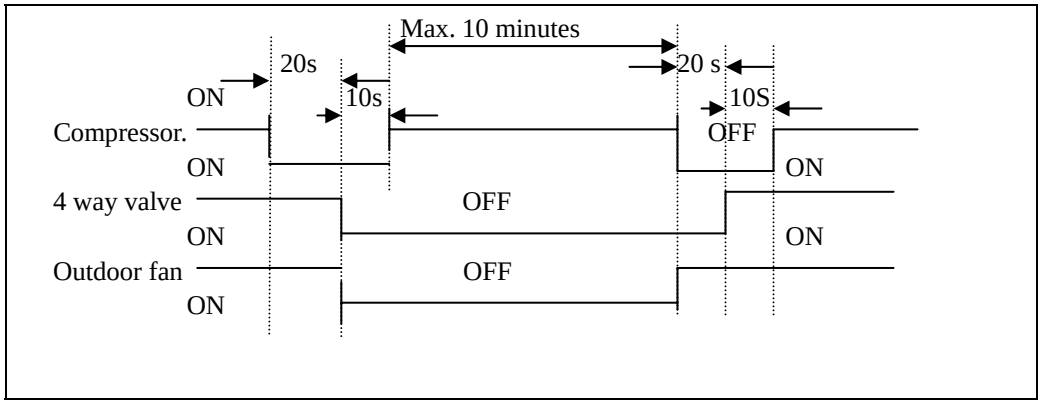
2. .Ending condition of defrosting

If one of following conditions is satisfied, end the defrosting and turn into heating mode:

a. The defrost time has reached to 10 minutes.

b. When the temperature of outdoor heat exchanger rises up to 15°C.

3.Defrosting Actions:



4.2. Fan-only mode

The outdoor unit doesn't operation, only the indoor fan runs. The fan speed can be set on HIGH MID LOW, and the louver can be regulated by remote controller.

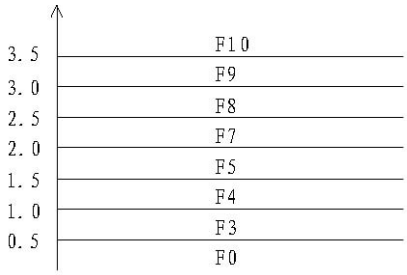
4.3. Cooling mode

4.3.1 Compressor frequency controlling

a. Frequency control when starting

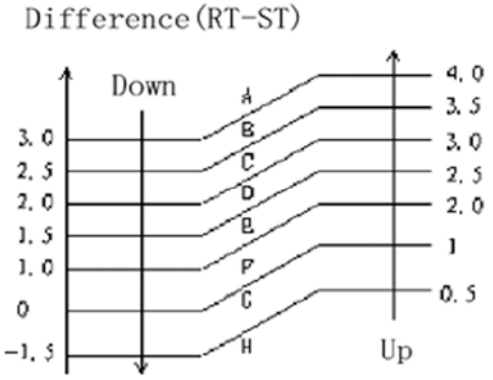
Temperature difference= Room temperature (RT)-Set temperature (ST)

RT-ST



b. Frequency control during operation

The frequency will change according to the RT-ST, and details see following fig.



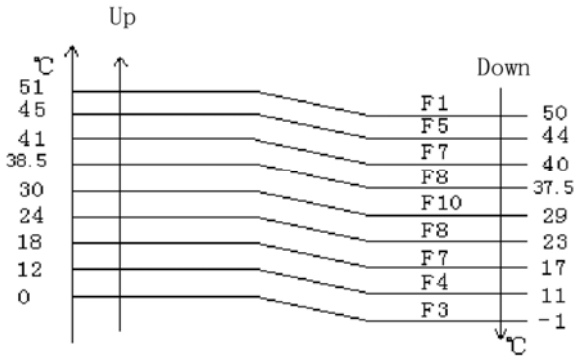
A-—E: rise the present frequency one class (for example, from F3 to F4)

F: Frequency keep unchanged

G: lower the present frequency on class(for example, from F4 to F3), and the maximum frequency is F3 in G area.

H: The compressor stops.

c. Frequency will change due to outdoor temperature, details see following fig.



4.3.2 Indoor heat exchanger anti-frozen

When indoor air sensor temperature is less than 3℃, the frequency will lower down to protect indoor heat exchanger. When indoor air sensor temperature is higher than 6℃ for more than 10 minutes, the air conditioner will return to former mode.

When indoor air sensor temperature is less than -1℃, the compressor will stop to protect indoor heat exchanger. When indoor air sensor temperature is higher than 6℃ for more than 10 minutes, the air conditioner will return to former mode.

4.3.3 Outdoor heat exchanger anti-overheated

When condenser temperature is higher than 54℃, the compressor frequency will be lowered down to protect the heat exchanger , and the outdoor fan runs in high speed. When condenser temperature lower down to 52℃, the compressor frequency rise up, and when the condenser temperature lower to 50℃ and keep for 5 minutes, and compressor frequency will rise to former value.

When condenser temperature is higher than 60℃, the compressor will stop, and hen the condenser temperature lower to 50℃ and keep for 5 minutes, and compressor frequency will rise to former value

4.4. Dehumidifying mode

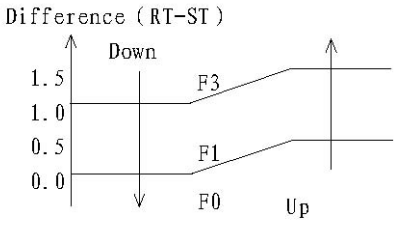
4. 4. 1 Temperature set and motor control in dehumidifying mode

The compressor and outdoor fan run in dehumidifying mode similar as cooling mode, and the temperature can be set.

The indoor motor speed need to be set in low speed.

4.4.2 Compressor frequency on dehumidifying mode

The maximum frequency in dehumidifying mode is F3, and the frequency changes as following fig.



4.4.3 The louver control in dehumidifying mode

The Louver control in dehumidifying mode is same as cooling mode.

4.4.4 Protection

The **Indoor heat exchanger anti-frozen and** Outdoor heat exchanger anti-overheat is same as cooling mode.

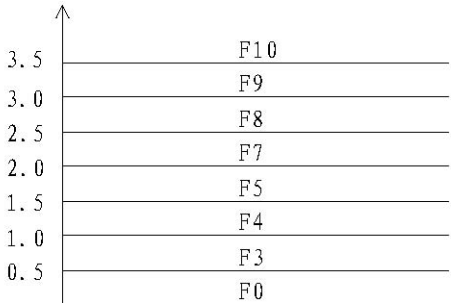
4.5. Heating mode

4.5.1 Compressor frequency controlling

a. Frequency control when starting

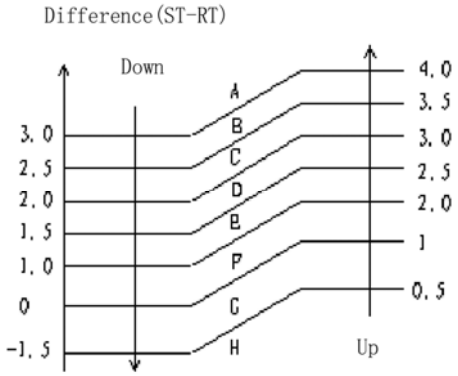
Temperature difference= Room temperature (RT)-Set temperature (ST)

RT-ST



b. Frequency control during operation

The frequency will change according to the RT-ST, and details see following fig.



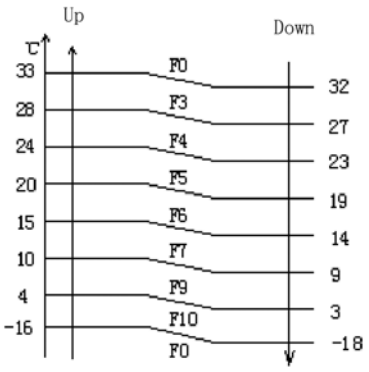
A-—E: rise the present frequency one class (for example, from F3 to F4)

F: Frequency keep unchanged

G: Lower the present frequency on class (for example, from F4 to F3), and the maximum frequency is F3 in G area.

H: The compressor stops.

c. Frequency will change due to outdoor temperature, details see following fig.



4.5.2 Indoor heat exchanger anti-overheated

When indoor exchanger temperature is higher than 50℃, the compressor frequency will be lowered down to protect the heat exchanger. When indoor exchanger temperature lower down to 46℃, the compressor frequency rise up, and when the indoor exchanger temperature lower to 44℃ and keep for 5 minutes, and compressor frequency will rise to former value.

When condenser temperature is higher than 54℃, the compressor will stop, and hen the condenser temperature lower to 44℃ and keep for 5 minutes, and compressor frequency will rise to former value

4.6 Emergency Operation

The set temperature is 24℃, and the fan speed is AUTO during emergency operation.

Press emergency switch within 5 s during stand-by mode, and the air conditioner starts emergency mode if there is DU sound from indoor unit.

Press emergency switch during operation mode, and the air conditioner can be turned off.

Note: During emergency mode, the air conditioner will turn to the mode set by remote controller after receiving signal from remote controller.

4.7 Sleeping operation

Cooling mode: Press sleep button, the fan speed lower down one class automatically (HI-ME-LO-VL). The set temperature rise one degree, and rise one degree again one hour later, then keep it.

Heating mode: Press sleep button, the fan speed lower down one class automatically (HI-ME-LO-VL). The set temperature lower one degree, and lower one degree again one hour later, then keep it.

Note: During sleep mode, if change the set temperature, the actual set temperature is new set temperature plus lowered or rised temperature.

4.8 Auto restart:

The air conditioner will restart with set mode automatically after power on again, and this can be canceled by user, and to cancel this mode follow the following instructions:

1. Press ON/OFF button 6 times within 7 s, and the AUTO restart mode can be cancelled.
2. Press ON/OFF button 6 times within 7s, and the AUTO restart mode can be set again.

4.9 Refrigerant charge mode

Entry condition：

Press the emergency switch over 5 seconds, there will be three “DU” sound in the indoor unit, and start the unit with the remote controller.

Actions：

1. On cooling mode, the indoor fan speed is low
   the frequency is fixed on F6,
2. Cancel the mode：
   Turn off the air conditioner with remote controller

5. Protection

5.1 Compressor protection

5.1.1 High pipe discharge temperature protection

When discharge pipe temperature is higher than T3, the compressor frequency will be lowered, when discharge pipe temperature lower to T1, the frequency will rise, and the frequency will be limited one class than former one. When the discharge pipe temperature lower to T2 and keep for 10 minutes, the frequency will return to former one.

When discharge pipe temperature is higher than T4, the compressor stop and the outdoor motor stop 15s later. When discharge pipe temperature lower to T1 and the unit restart after 3 minutes.

	T1	T2	T3	T4
KFR-25GWZ/BM	90	95	105	110
KFR-35GWZ/BM				
KFR-50GWZ/BM				
KFR-70GWZ/BM				

5.1.2 Sensor protection

There is thermal sensor on compressor, and the compressor will stop when the temperature is too high, and the outdoor motor will stop 15s later. When the temperature return normal value, the compressor will restart 3 minutes later.

5.1.3 Compressor relay start protection

The compressor will restart 3 minutes after stop.

5.2 Current protection

When outdoor current is higher than I1, the compressor frequency will be limited and prohibited to rise. When the current is higher than I2, and the compressor frequency will lower until the current is lower than I1.

When outdoor current is lower than I3, the compressor will stop.

The detailed current value see below table:

KFR-25GWZ/BM

MODE	I1	I2	I3
COOLING AND DEHUMIDIFYING	7.1	8.3	10.3
HEATING	6.3	7.5	9.5

KFR-35GWZ/BM

MODE	I1	I2	I3
COOLIGN AND DEHUMIDIFYING	8.1	9.6	11.6
HEATING	10.5	12	14

KFR-50GWZ/BM

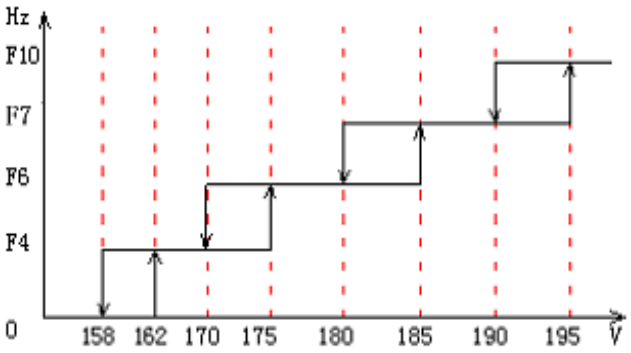
MODE	I1	I2	I3
COOLING AND DEHUMIDIFYING	8.5	10.5	12.5
HEATING	8.5	10.5	12.5

KFR-70GWZ/BM

MODE	I1	I2	I3
COOLIGN AND DEHUMIDIFYING	12	16	18
HEATING	14	19	21

5.3 Low voltage protection

The compressor frequency changes as following fig. during low voltage:

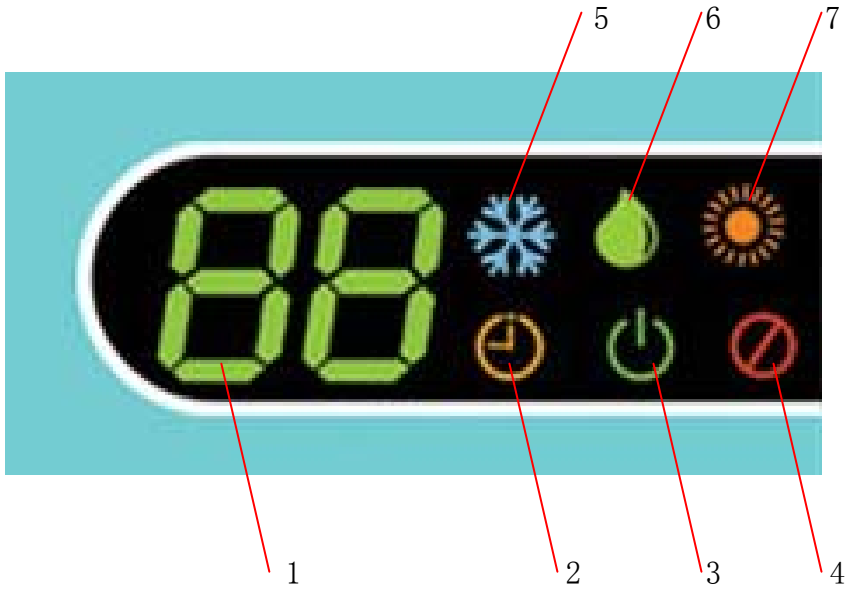


When voltage value lower than 190V and keep for 10s, the low voltage protection start, and when voltage value rise to 195V and keep for 10s, the low voltage proteccion finish.

When voltage value lower than 158V, the unit turn off, when voltage rise to 162V, keep for 10s, the unit restart.

6、Display lamp

6.1 Indoor display



1 Dual-Digital lamp; 2 Timer Lamp; 3 Operation lamp; 4 Protection Lamp; 5 cooling mode; 6 dehumidify mode; 7 heating mode 。

6.2 Fault code display

KFR-25GWZ/BM、KFR-35GWZ/BM

Item	FAULT	CODE	CHECK POINT	COUNT MEASURE
1	INDOOR UNIT DON'T MATCH OUTDOOR UNIT	EP	CHECK IF THE INDOOR UNIT MATCH OUTDOOR UINT	CHANGE WRONG UNIT。
2	OUTDOOR DISCHARGE PIPE SENSOR FAULT	E0	1、CHECKTHE VALUE OF SENSOR 2、OUTDOOR POWER BOARD IS FAULT（CHECK CAPICATOR）	CHANGE SENSOR CHANGE POWER BOARD

3	COMMUNICATION FAULT BETWEEN INDOOR UNIT AND OUTDOOR UNIT	E4	1. CHECK IF THE CONNECTING WIRING IS CONNECT WELL 2. TEST THE VOLTAGE VALUE BETWEEN L4 AND S, IF IT 'S CHANGE REGULARLY, THE SINGAL TRANSFERING BETWEEN INDOOR AND OUTDOOR UNIT IS GOOD, WHEN IT 'S NO CHANGE IF VALUE IS BELOW 14V, THE INDOOR PCB BOARD IS FAULT, CHANGE IT. IF VALUE IS OVER 14V, THE OUTDOOR PCB IS FAULTY 3) CHECK IF THERE IS LED FLASHING ON THE OUTDOOR PCB IF THERE IS NO FLASHING, CHECK VOLTAGE VALUE FROM POWER BOARD TO PFC BOARD, BETWEEN ACL AND CAN ON PFC BOARD IF IT'S NOT 220V, CHANGE POWER BOARD IF IT'S 220V, CHANGE PFC BOARD	1. FIX THE WIRING AGAIN。 2. CHANGE RELATE PCB BOARD
4	COMPRESSOR DRIVER BOARD IS	EA	CHECK OUTDOOR DRIVER BOARD	CHANGE DRIVER BOARD
5	OURDOOR AIR SENSOR IS FAULTY	E6	1、CHECK THE SENDOR VALUE 2、POWER BOARD IS FAULT	CHANGE SENSOR CHANGE POWER BAORD。
6	OUTDOOR PIPE SENSOR IS FAULT			
7	INDOOR AIR SENSOR IS FAULTY	E1	3、CHECK THE SENSOR VALUE 4、INDOOR BOARD IS FAULT	CHANGE SENDOR
8	INDOOR PIPE SENSOR IS FAULTY	E2		CHANGE INDOOR BOARD
9	POWER BOARD IS FAULT	E8	OUTDOOR POWER BOARD IS FAULT	CHANGE THE POWER BOARD
10	POWER BOARD IS FAULT	E9	OUTDOOR POWER BOARD IS FAULT	CHANGE THE POWER BOARD
11	DRIVER BOARD IS FAULT	E5	DRIVER BOARD IS FAULT	DRIVER BOARD IS FAULT
12	OUDOOR COMMUNICATION FAULTY	EC	CHECK IF WIRINGS BETWEEN POWER BOARD AND DRIVER BOARD ARE CONNECTED WELL	FIX THE WIRING BETWEEN POWER BOARD AND DRIVER BOARD

13	INDOOR MOTOR IS FAULT	E3	1、INDOOR MOTOR OR INDOOR MOTOR CAPACITOR IS FAULT 2、INNER WIRING DON'T CONNECT WELL 3、INDOOR PCB IS FAULT 4、INDOOR MOTOR IS BLOCKED	1、CHANGE MOTOR OR CAPACITOR 2、FIX THE WIRINGS 3、CHANGE INDOOR PCB 4、REMOVE THE BLOCKING
14	INDOOR PCB BAORD IS FAULTY	EE	INDOOR PCB BAORD IS FAULTY	INDOOR PCB BAORD IS FAULTY
1	OUTDOOR DISCHARGE TEMP IS TOO HIGH	P1	1、CHECK IF THE OUTLET IS BLOCKED OR THE CONDENSOR IS DIRTY 2、CHECK THE OUTDOOR MOTOR WORK NORMALLY 3、CHECK IF THE REFRIGERANT IS CHARGED TOO MUCH	1、REMOVE OBSTACLE AROUND OUTDOOR UNIT OR WASH THE CONDENSER 2、CHANGE OUTDOOR MOTOR OR MOTOR CAPACITOR 3、REGULATE THE QUANTITY OF REFRIGERANT
2	DRIVER BOARD PROTECTION	P7	1、CHECK IF THE REFRIGERANT IS CHARGED TOO MUCH 2、CHECK IF THE COMPRESSOR IS BLOCKED 3、IPM MOLD IS FAULT	1、REGULATE THE QUANTITY OF REFRIGERANT 2、CHANGE COMPRESSOR 3、CHANGE IPM MOLD
3	THE VOLTAGE IS NOT STABLE	P3	CHECK THE POWER SUPPLY	RESTART THE AIR CONDITIONER
4	ELECTRIC CURRENT IS TOO HIGH	P2	1、CHECK IF THE REFRIGERANT IS CHARGED TOO MUCH 2、CHECK IF THE VOLTAGE IS TOO LOW, POWER WRINGIS TOO THIN OR TOO LONG OR CONTACT BADLY 3、CHECK IF THE OUTLET IS BLOCKED OR THE CONDENSOR IS DIRTY 4、CHECK THE OUTDOOR MOTOR WORK NORMALLY	1、REGULATE THE QUANTITY OF REFRIGERANT 2、UPDATING POWER SUPPLY, CHANG POWER WIRING 3、 REMOVE OBSTACLE AROUND OUTDOOR UNIT OR WASH THE CONDENSER 4、CHANGE OUTDOOR MOTOR OR MOTOR CAPACITOR
5	OCR TRIPED	P4	1.COMPRESSOR OCR IS OPEN CURCUIT 2. CHECK IF THE OCR TEMPERATURE IS TOO HIGH AND OCR TRIPED	1、 CHANGE OCR OR COMPRESSOR 2、TURN OFF THE AIR CONDITIONER, AND RESTART IT 2 HOUR LATER 3、IF AIR CONDITIONER IS ON AND OFF REGULARLY, CHECK OUTDOOR MOTOR OR MOTOR CAPACITOR, THE OUTLET IS BLOCKED OR THE CONDENSOR IS DIRTY
6	INDOOR PIPE TEMP. IS TOO HIGH WHEN HEATING	P5	1、CHECK INDOOR MOTOR WORK NORMALLY 2、CHECK FILTER NET OR EVAPERATOR IS DIETY	1、CHANGE OUTDOOR MOTOR OR MOTOR CAPACITOR。 2、 WASH THE FILETE NET OR EVAPERATOR
7	OUTDOOR PIPE TEMP. ID TOO	P6	1、CHECK IF THE REFRIGERANT IS CHARGED TOO MUCH	1、REGULATE THE QUANTITY OF REFRIGERANT

	HIGH		2、CHECK IF THE VOLTAGE IS TOO LOW, POWER WRINGIS TOO THIN OR TOO LONG OR CONTACT BADLY 3、CHECK IF THE OUTLET IS BLOCKED OR THE CONDENSOR IS DIRTY	2、UPDATING POWER SUPPLY, CHANG POWER WIRING 3、REMOVE OBSTACLE AROUND OUTDOOR UNIT OR WASH THE CONDENSER
8	DRIVER BOARD IS FAULT	P0	DRIVER BOARD IS FAULT	CHANGE DRIVER BAORD

KFR-50GWZ/BM、KFR-70GWZ/BM

Item	FAULT	CODE	CHECK POINT	COUNT MEASURE
1	INDOOR AIR SENSOR IS FAULTY	E1	1、CHECK THE SENSOR VALUE 2、INDOOR BOARD IS FAULT	CHANGE SENDOR CHANGE INDOOR BOARD
2	INDOOR PIPE SENSOR IS FAULTY	E2		
3	INDOOR IN-PHASE MOTOR IS FAULT	E3	----------	----------
4	COMMUNICATION FAULT BETWEEN INDOOR UNIT AND OUTDOOR UNIT	E4	1、CHECK IF THE CONNECTING WIRING IS CONNECT WELL 2、TEST THE VOLTAGE VALUE BETWEEN L4 AND S, IF IT 'S CHANGE REGULARLY, THE SINGAL TRANSFERING BETWEEN INDOOR AND OUTDOOR UNIT IS GOOD, WHEN IT'S NO CHANGE IF VALUE IS BELOW 14V, THE INDOOR PCB BOARD IS FAULT, CHANGE IT. IF VALUE IS OVER 14V,THE OUTDOOR PCB IS FAULTY 3、CHECK IF THERE IS LED FLASHING ON THE OUTDOOR PCB IF THERE IS NO FLASHING, CHECK VOLTAGE VALUE FROM POWER BOARD TO PFC BOARD, BETWEEN ACL AND CAN ON PFC BOARD IF IT'S NOT 220V, CHANGE POWER BOARD IF IT'S 220V,CHANGE PFC BOARD	1、FIX THE WIRING AGAIN。 2、CHANGE RELATE PCB BOARD
5	DRIVER BOARD IS FAULT)	E5	DRIVER BOARD IS FAULT	DRIVER BOARD IS FAULT
6	OUTDOOR SENSOR IS FAULT	E6	1、CHECK THE SENDOR VALUE 2、POWER BOARD IS FAULT	CHANGE SENSOR CHANGE POWER BAORD。
7	INDOOR MOTOR FAULTY	E7	----------	----------
8	COMMUNICATION SIGNAL IS NOT GOOD	E8	CHECK IF THE COMMUNICATION WIRING IS CONNECTED WELL. CHECK IF POWER BOARD OR DRIVER BOARD IS FAULT	FIX THE COMMUNICATION WELL CHANGE THE PCB BOARD

9	DRIVER BOARD IS FAULT	P0	DRIVER BOARD IS FAULT	DRIVER BOARD IS FAULT
10	OCR TRIPED	P1	1、COMPRESSOR OCR IS OPEN CURCUIT 2、 CHECK IF THE OCR TEMPERATURE IS TOO HIGH AND OCR TRIPED	1、CHANGE OCR OR COMPRESSOR 2、TURN OFF THE AIR CONDITIONER, AND RESTART IT 2 HOUR LATER 3、IF AIR CONDITIONER IS ON AND OFF REGULARLY, CHECK OUTDOOR MOTOR OR MOTOR CAPACITOR, THE OUTLET IS BLOCKED OR THE CONDENSOR IS DIRTY
11	POWER BOARD IS FAULT	P2	OUTDOOR POWER BOARD IS FAULT	CHANGE THE POWER BOARD
12	IPDU IS FAULT	P3	----------	----------
13	INDOOR UNIT DON'T MATCH OUTDOOR UNIT	P4	CHECK IF THE INDOOR UNIT MATCH OUTDOOR UINT	CHANGE WRONG UNIT。
14	ELECTRIC CURRENT IS TOO HIGH	P5	1、CHECK IF THE REFRIGERANT IS CHARGED TOO MUCH 2、CHECK IF THE VOLTAGE IS TOO LOW, POWER WRINGIS TOO THIN OR TOO LONG OR CONTACT BADLY 3、 CHECK IF THE OUTLET IS BLOCKED OR THE CONDENSOR IS DIRTY 4、CHECK THE OUTDOOR MOTOR WORK NORMALLY	1、REGULATE THE QUANTITY OF REFRIGERANT 2、UPDATING POWER SUPPLY, CHANG POWER WIRING 3、REMOVE OBSTACLE AROUND OUTDOOR UNIT OR WASH THE CONDENDSOR 4、CHANGE OUTDOOR MOTOR OR MOTOR CAPACITOR
15	THE VOLTAGE IS NOT STABLE	P6	CHECK THE POWER SUPPLY	RESTART THE AIR CONDITIONER
16	PFC FAULTY	P7	OUTDOOR PFC BOARD IS FAULT	CHANGE PFC BOARD
17	INDOOR MOTOR FEEDBACK FAULTY	P8	----------	----------

Note: The fault code doesn't display directly, and it will display as following instruction:

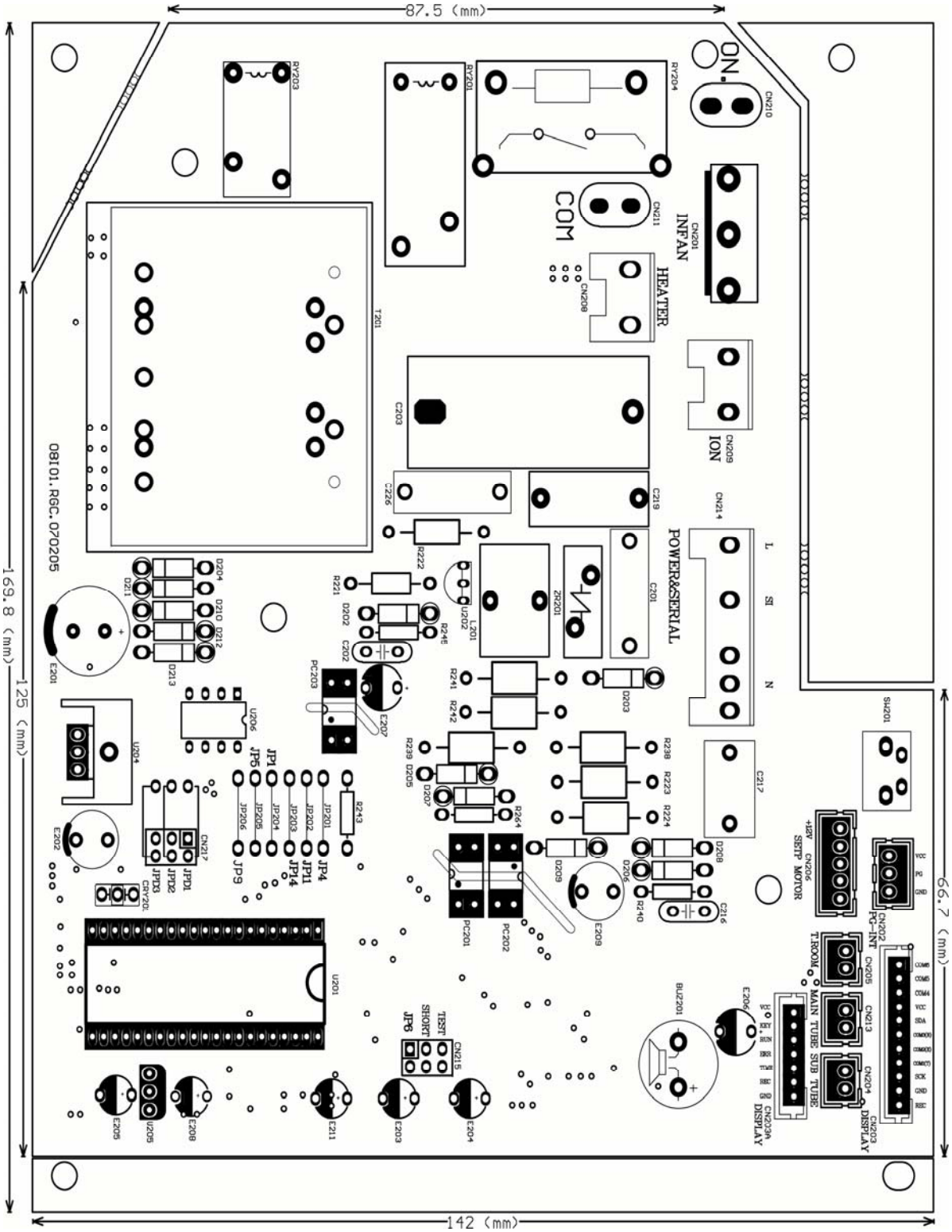
Press the ON/OFF button 6 times within 7 seconds, there will be three DU sound on indoor unit, and the indoor unit will display the fault code.

Annex

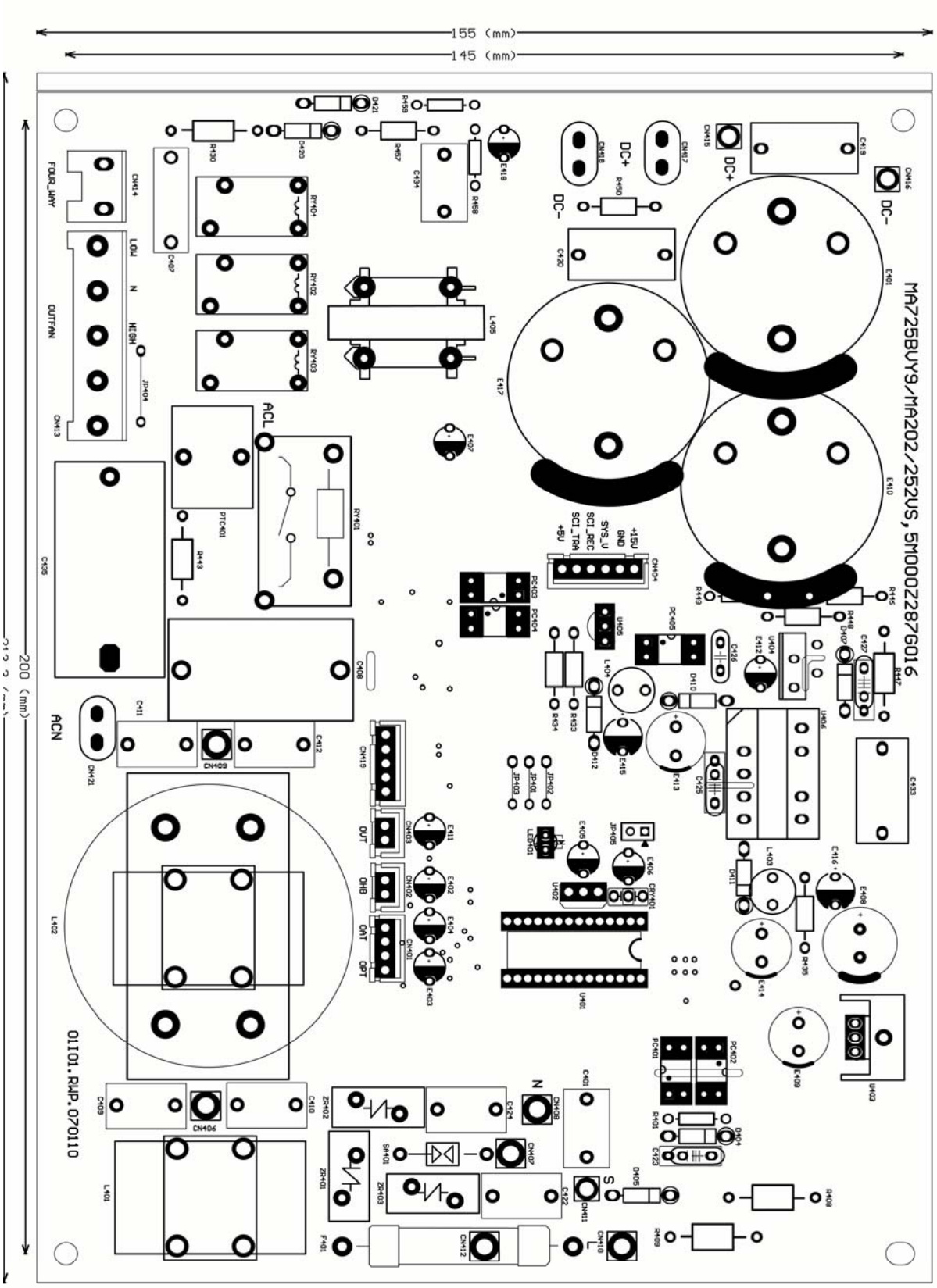
PCB diagram

KFR-25GWZ/BM、KFR-35GWZ/BM

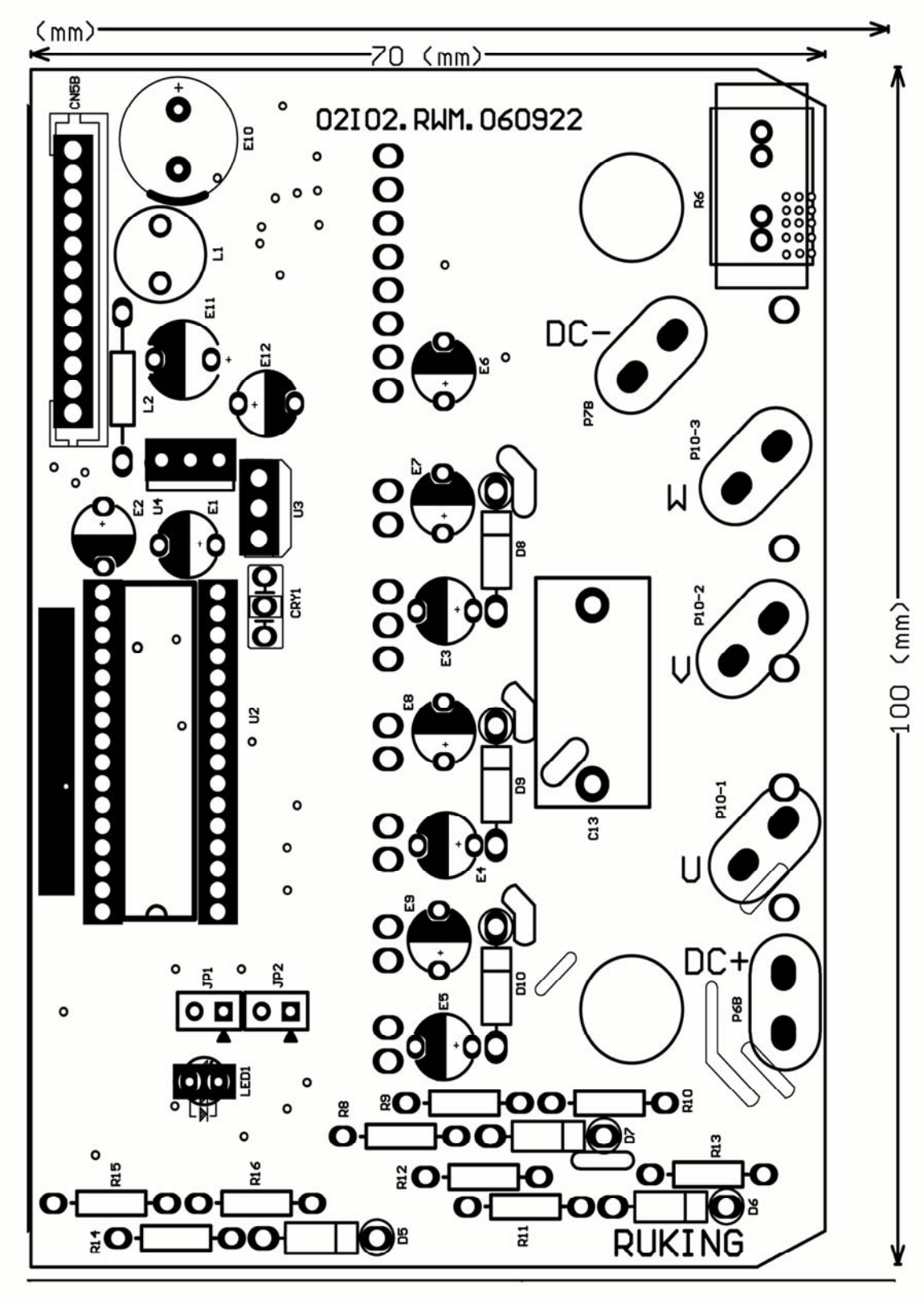
1、 Indoor PCB



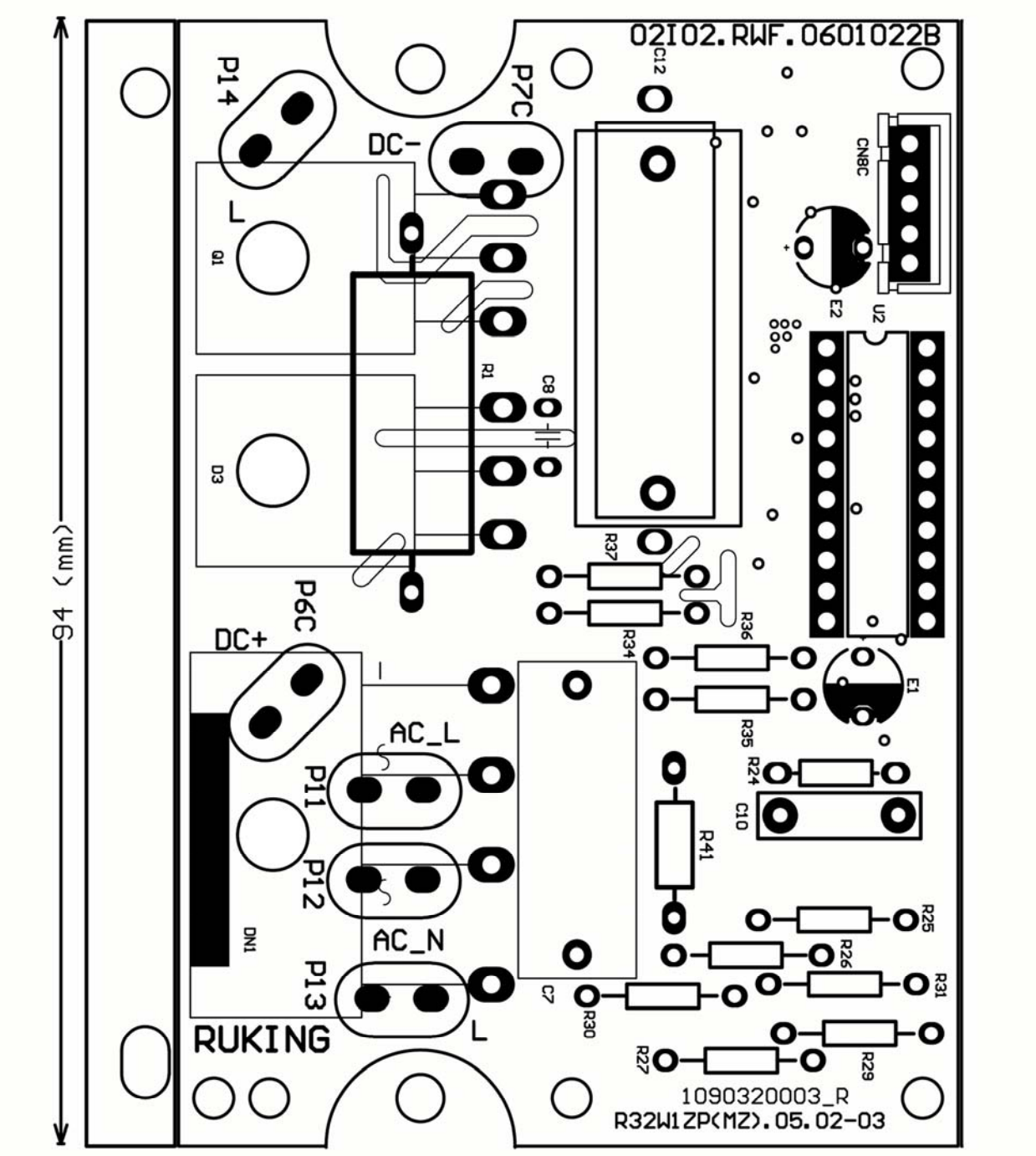
2、 Outdoor power board



3、 Outdoor diver board

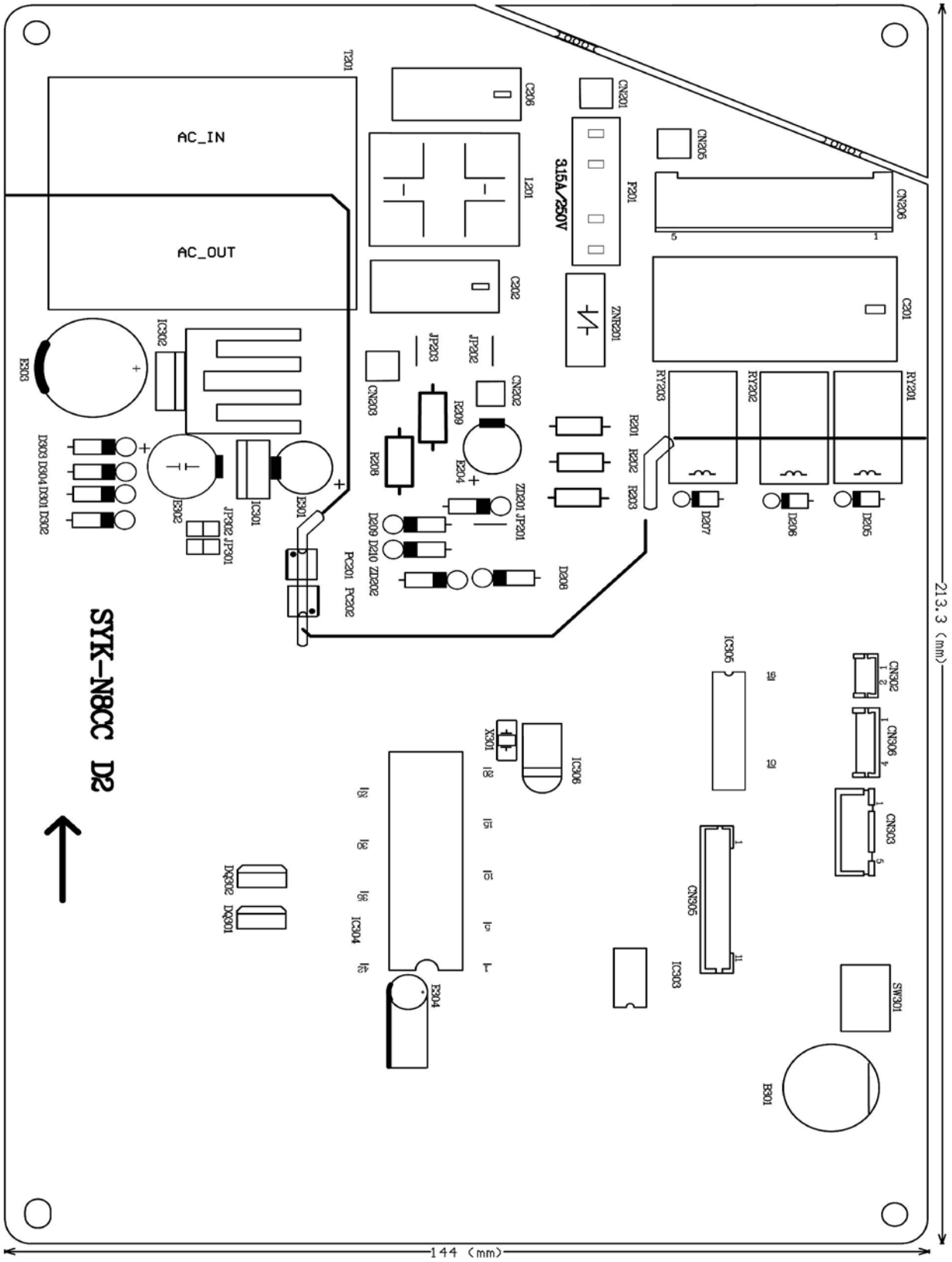


4、 Outdoor PFC board

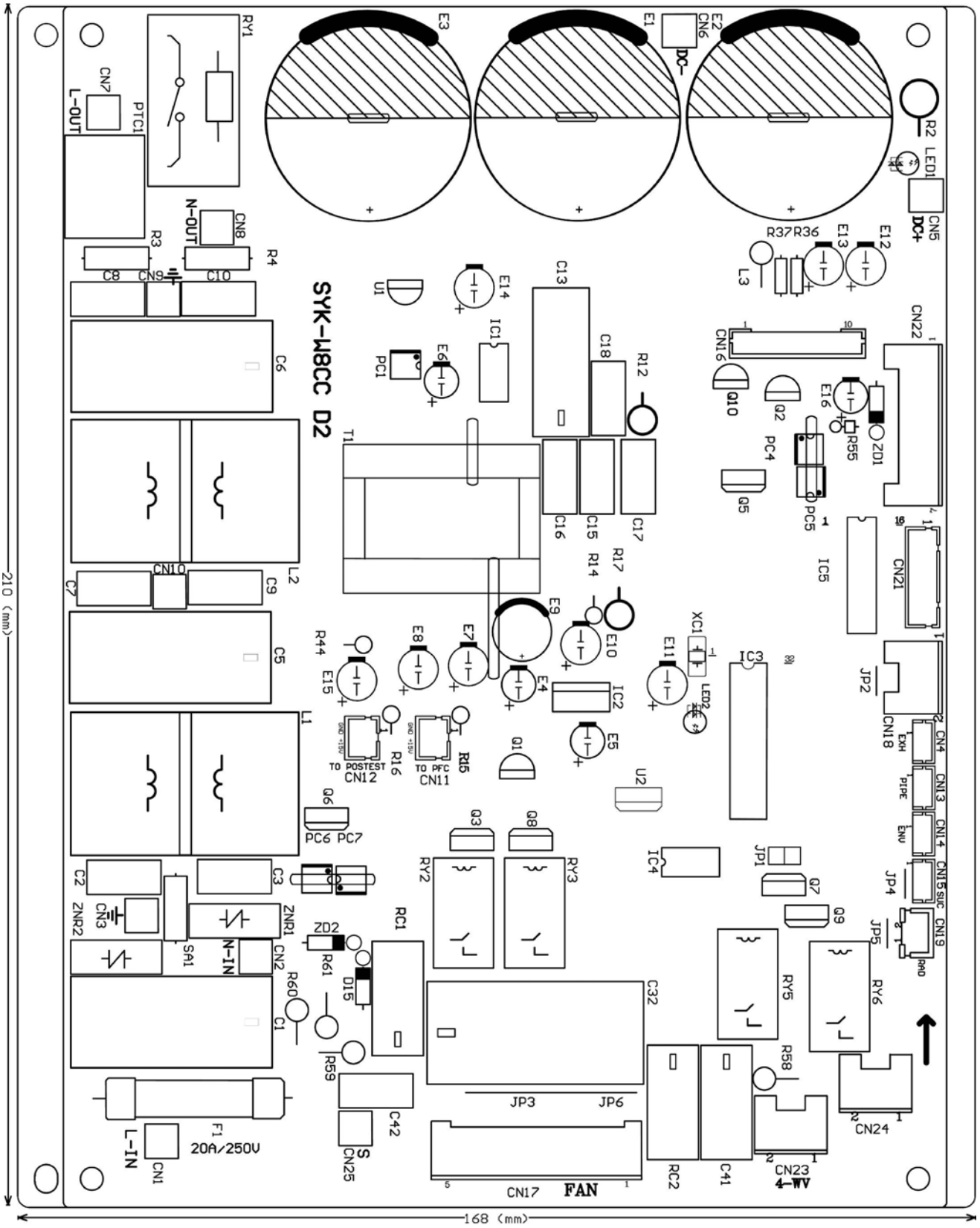


KFR-50GWZ/BM

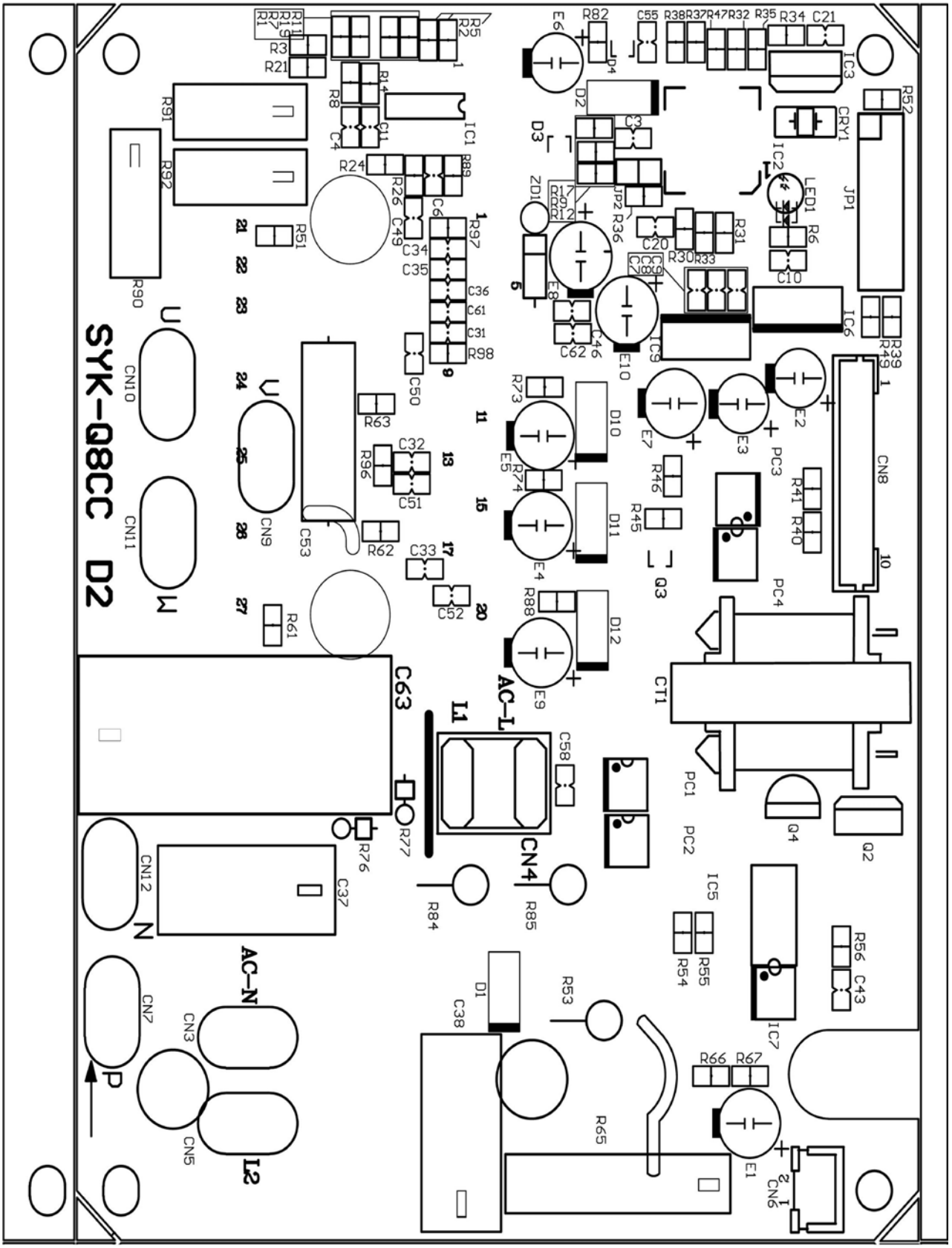
1、 Indoor PCB



2、Outdoor power board

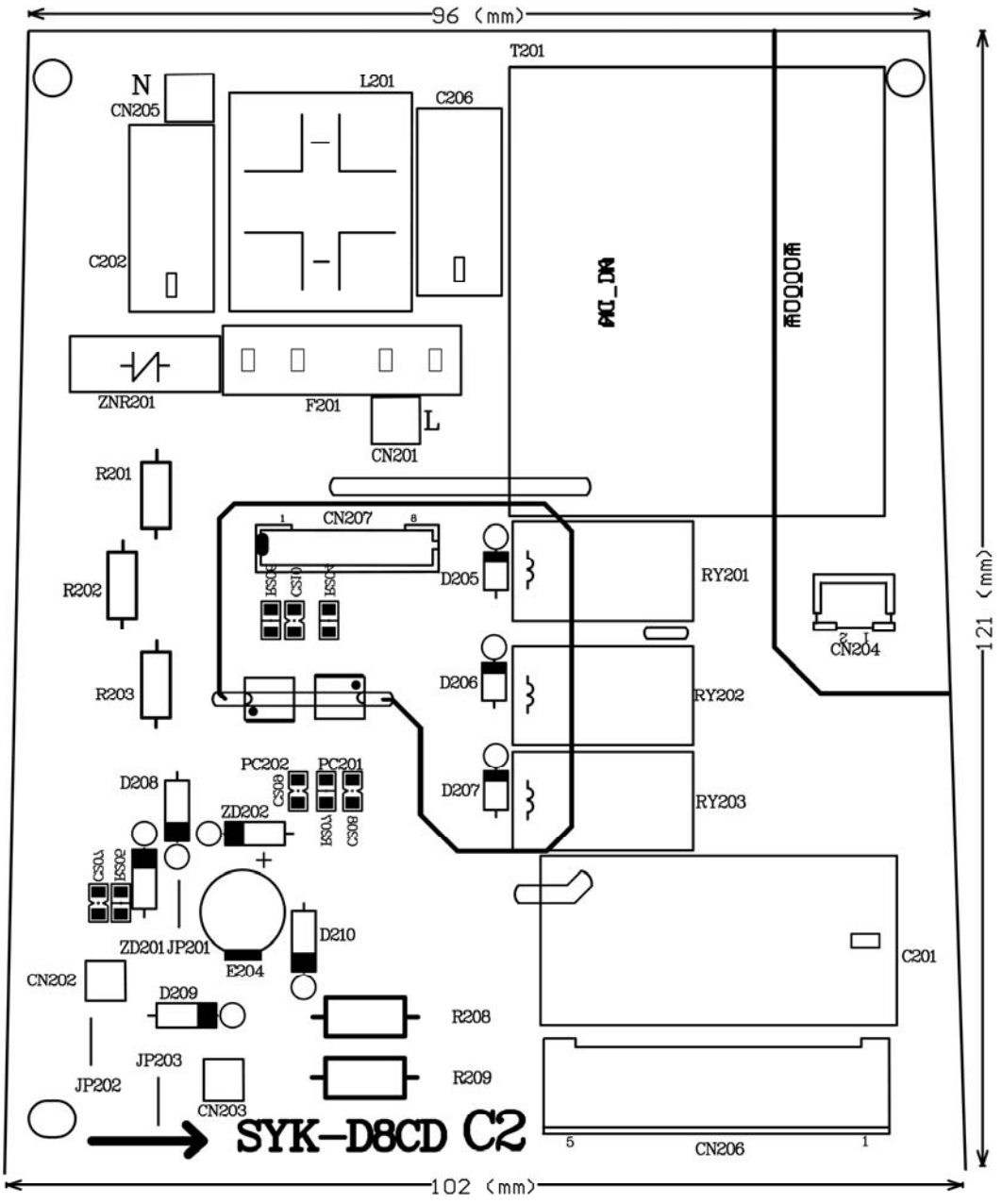


3、outdoor driver board

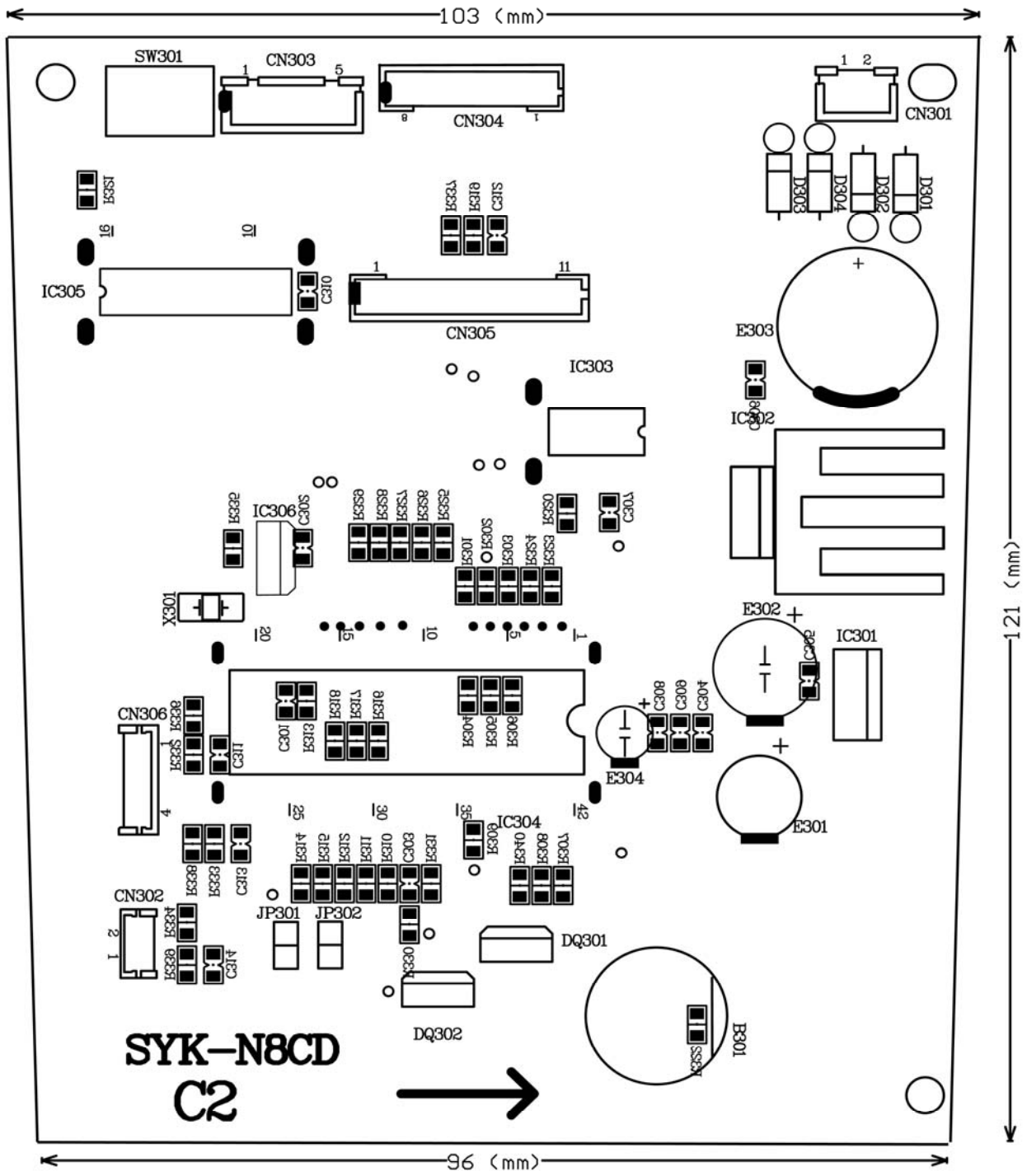


KFR-70GWZ/BM

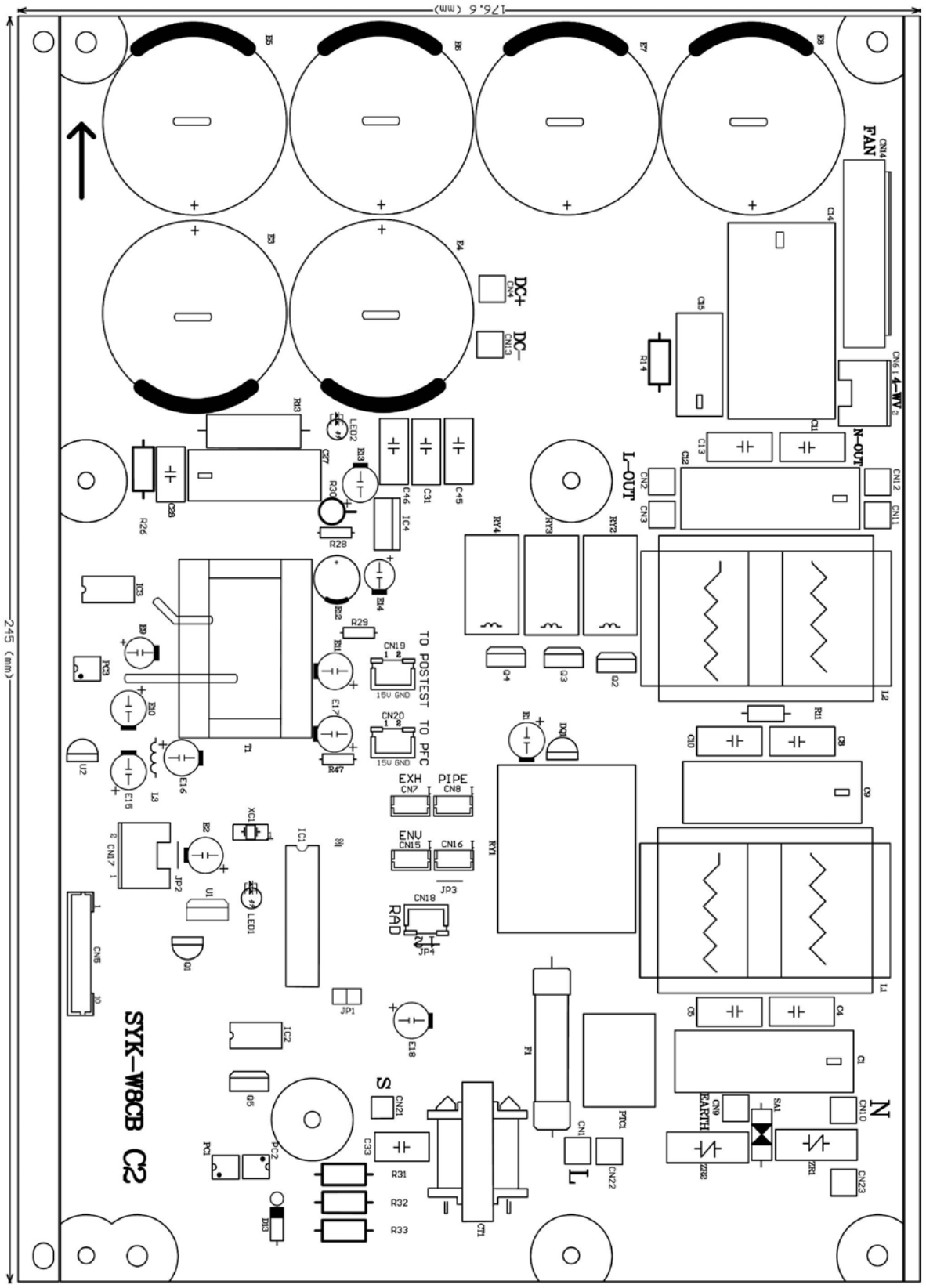
1、 Indoor power board



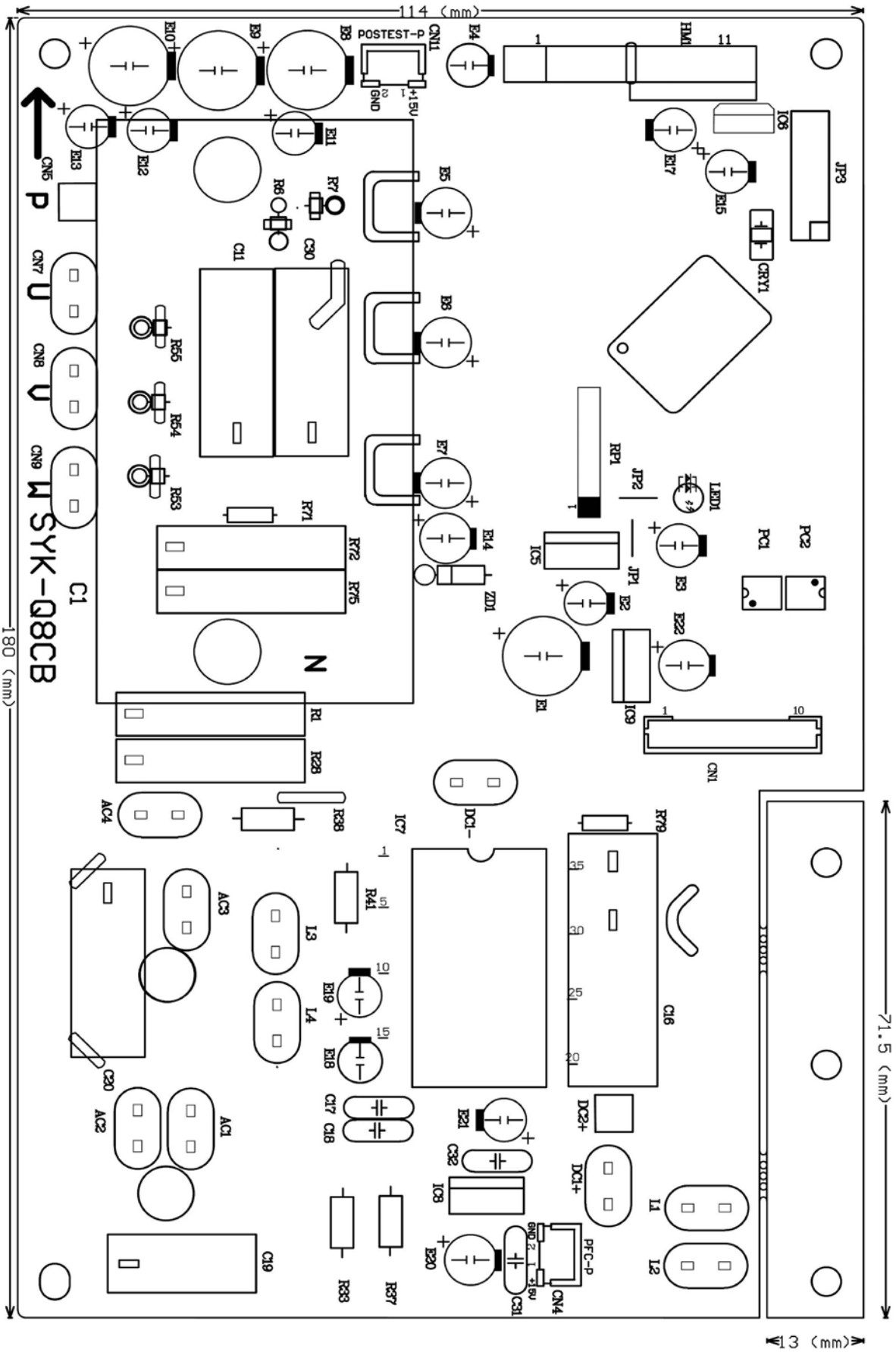
2、Indoor driver board



3、 outdoor power board



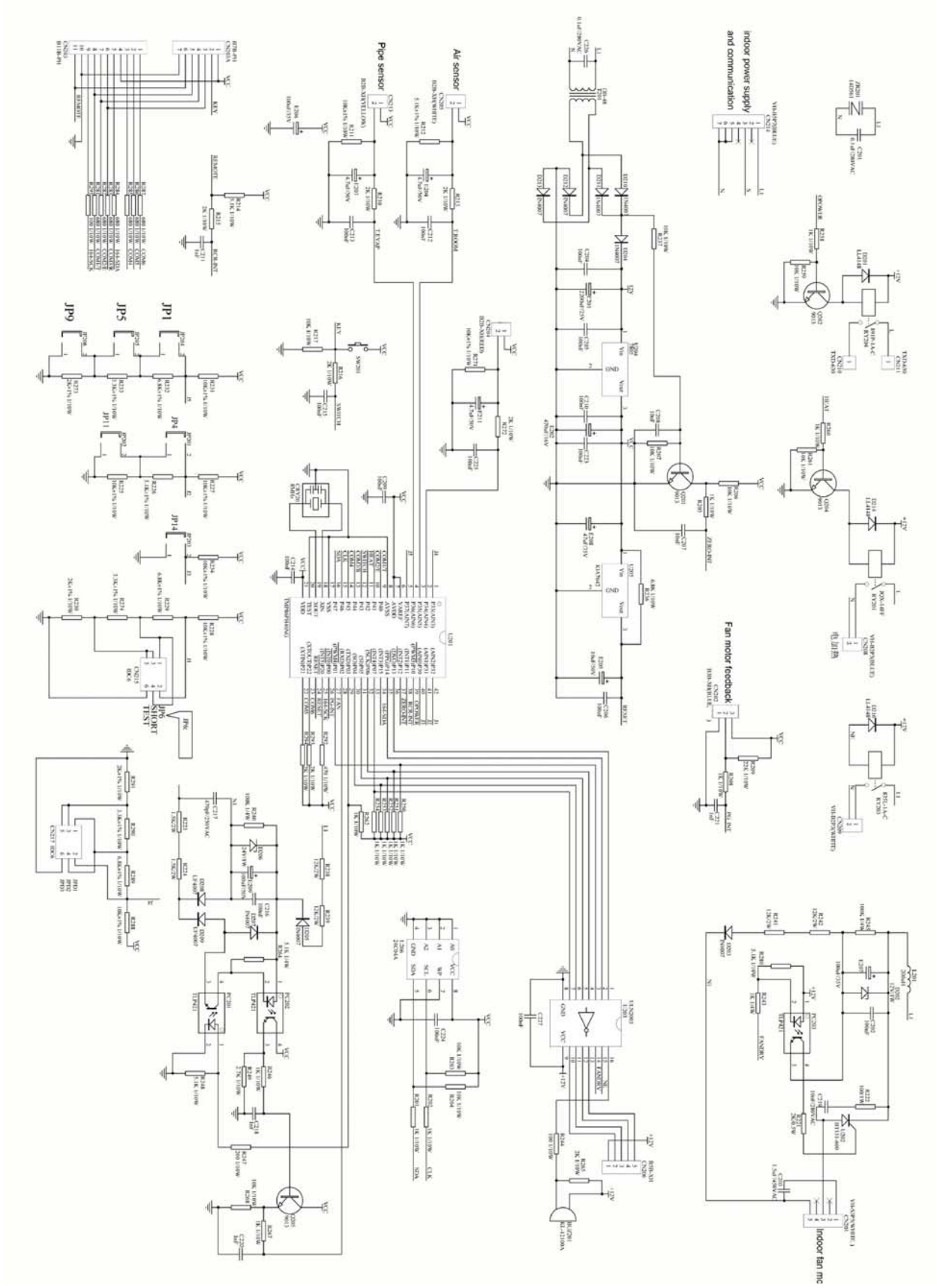
4、outdoor driver board



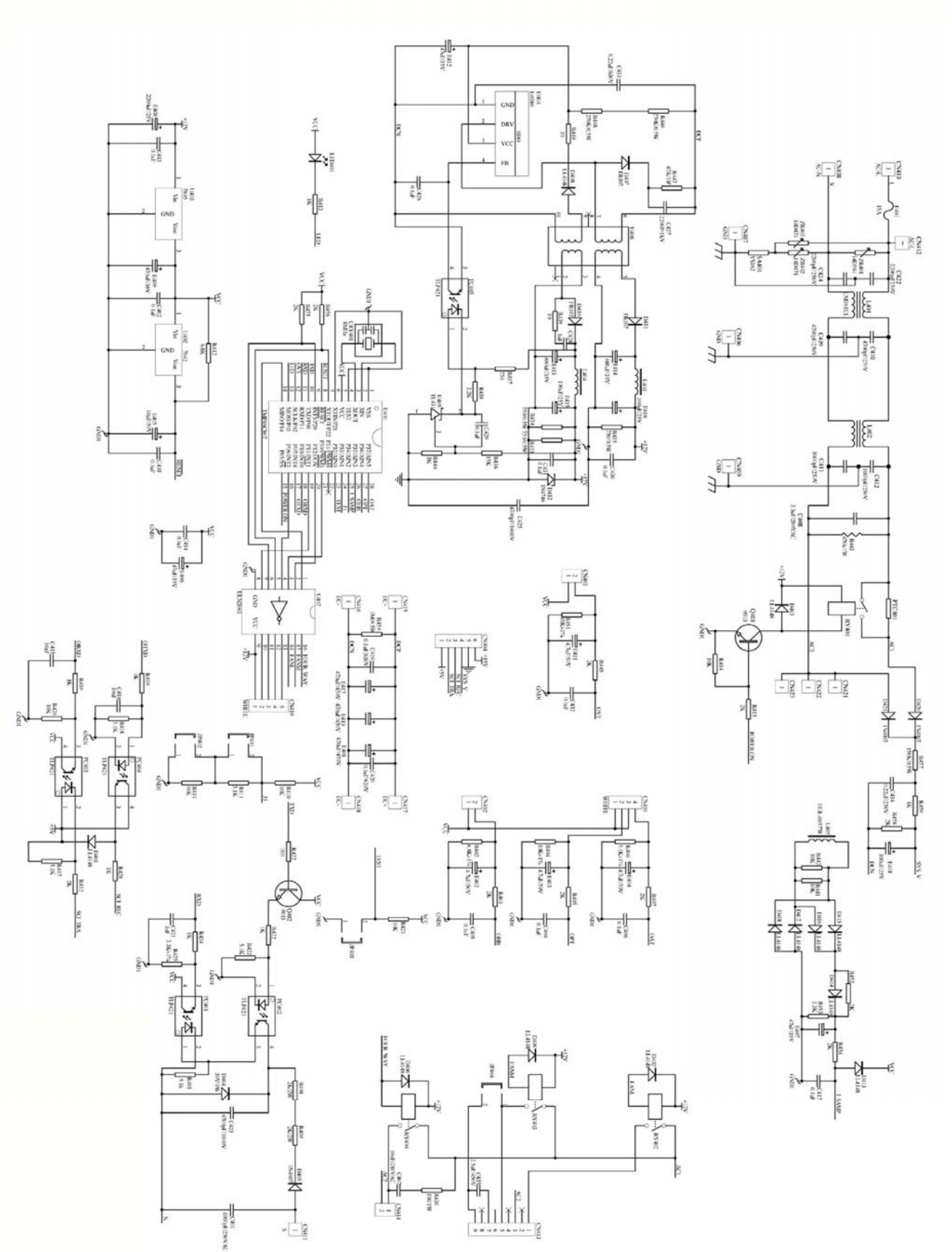
Schematic

KFR-25GWZ/BM、KFR-35GWZ/BM

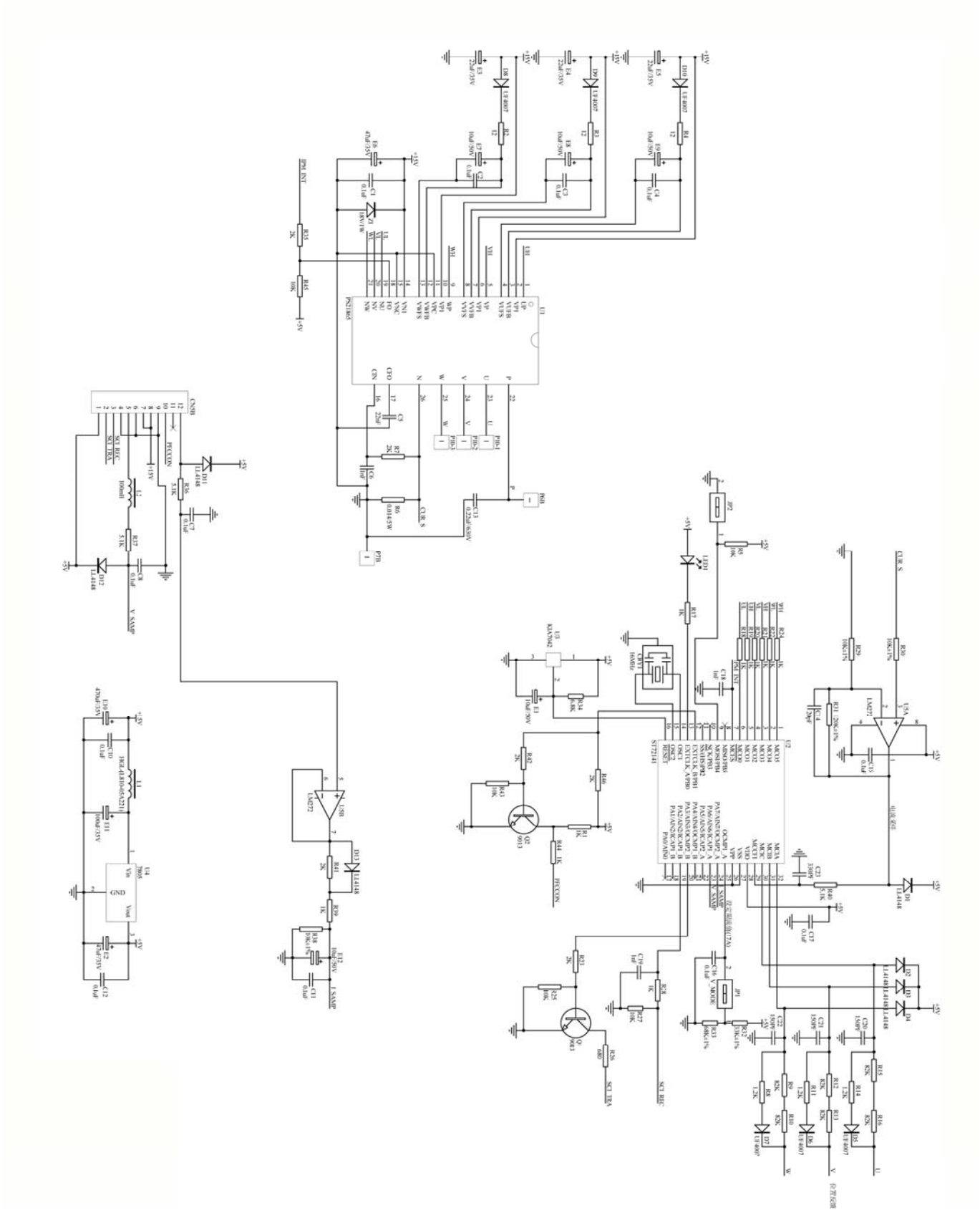
1、 Indoor PCB



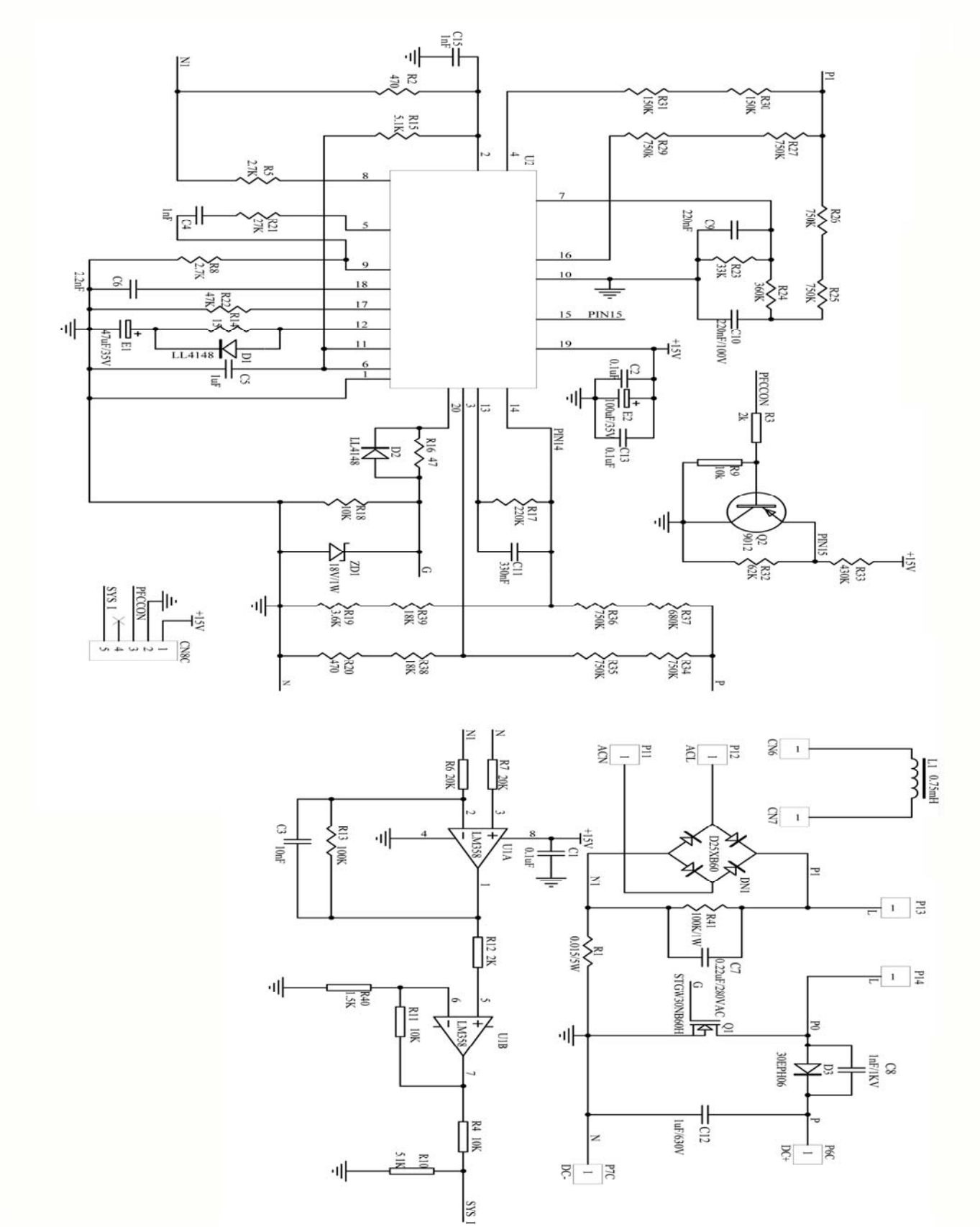
2、 Outdoor power board



3、Outdoor diver board

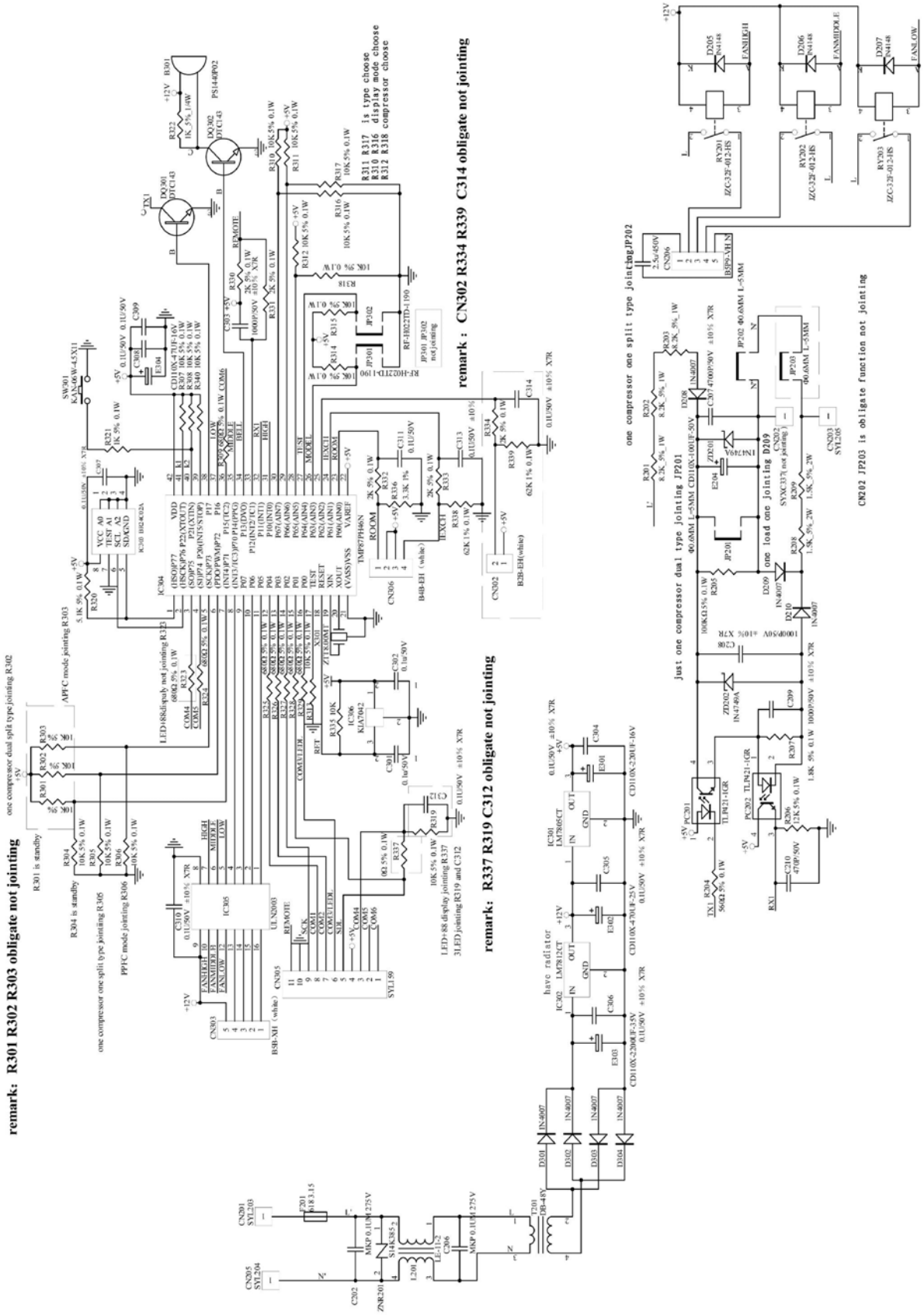


4、Outdoor PFC board

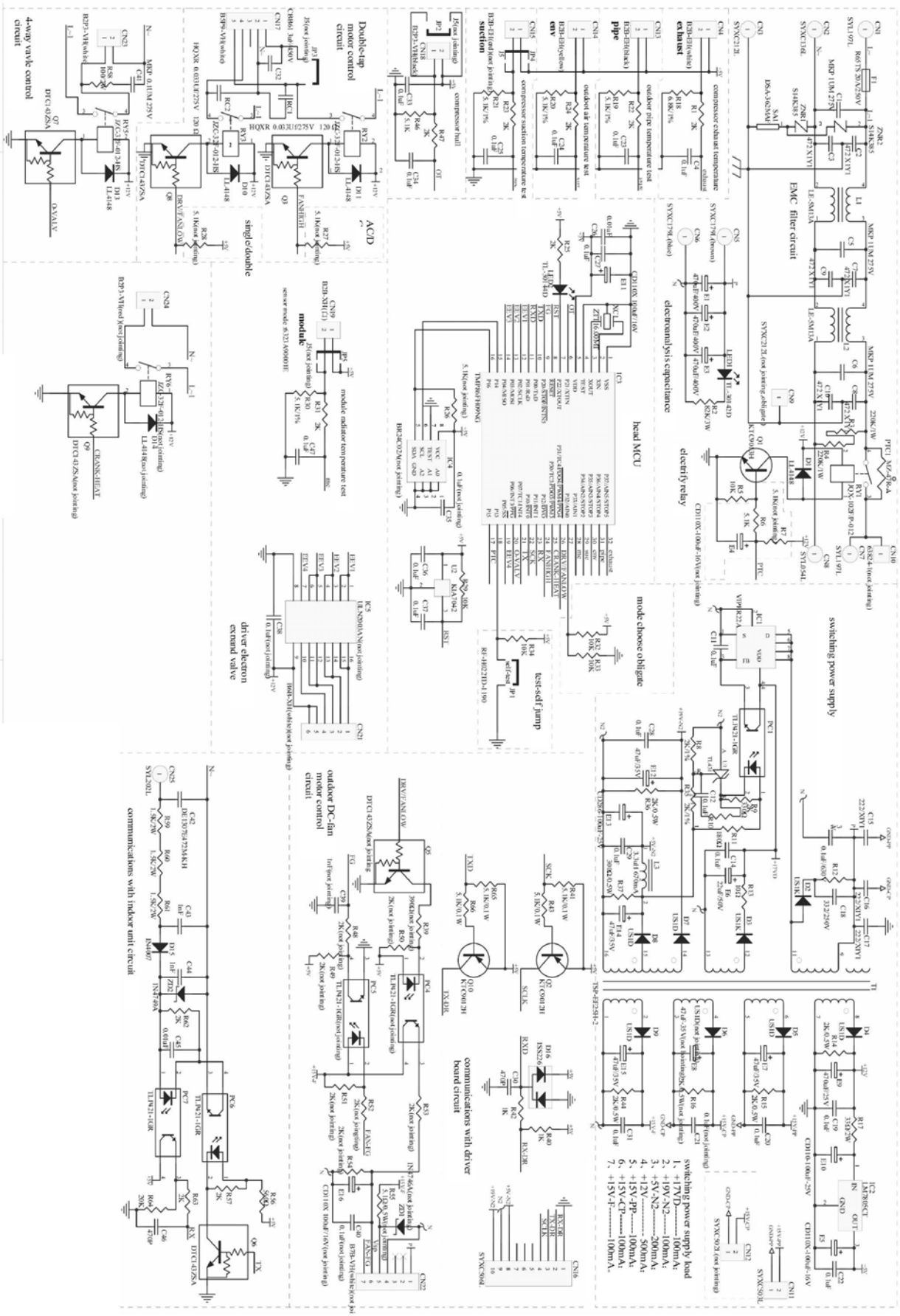


KFR-50GWZ/BM

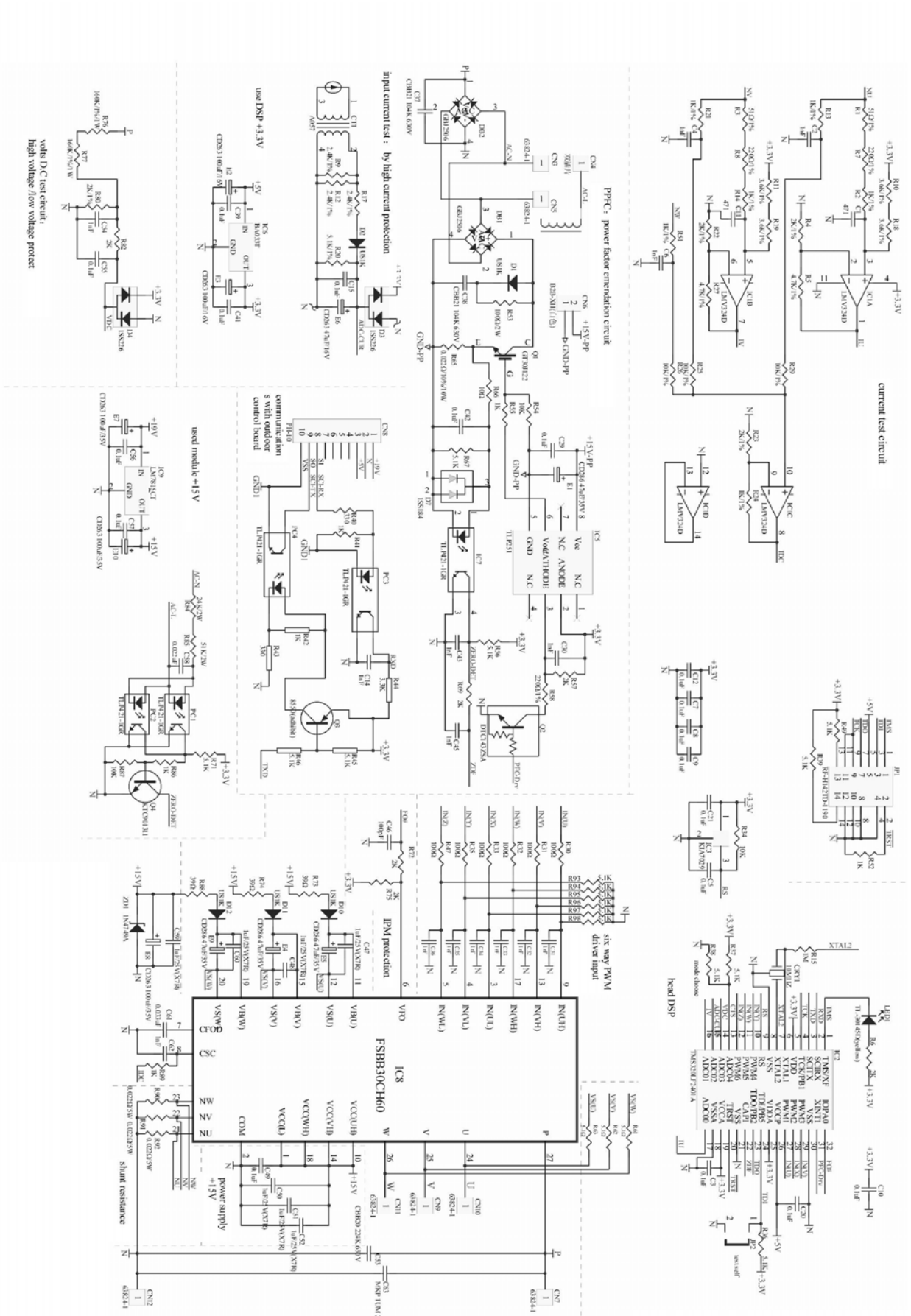
1、 Indoor PCB



2、 outdoor power board

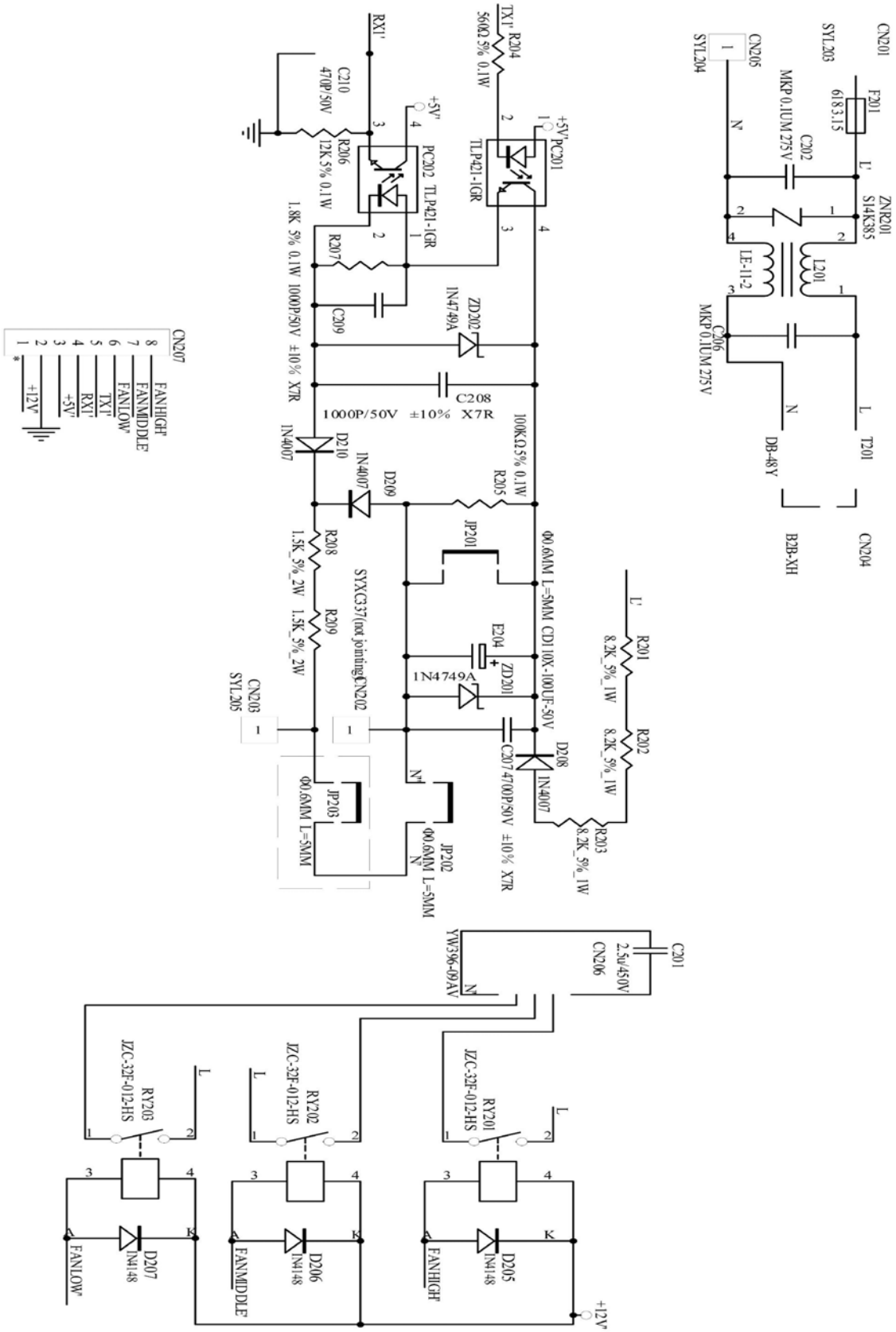


3、 outdoor driver board

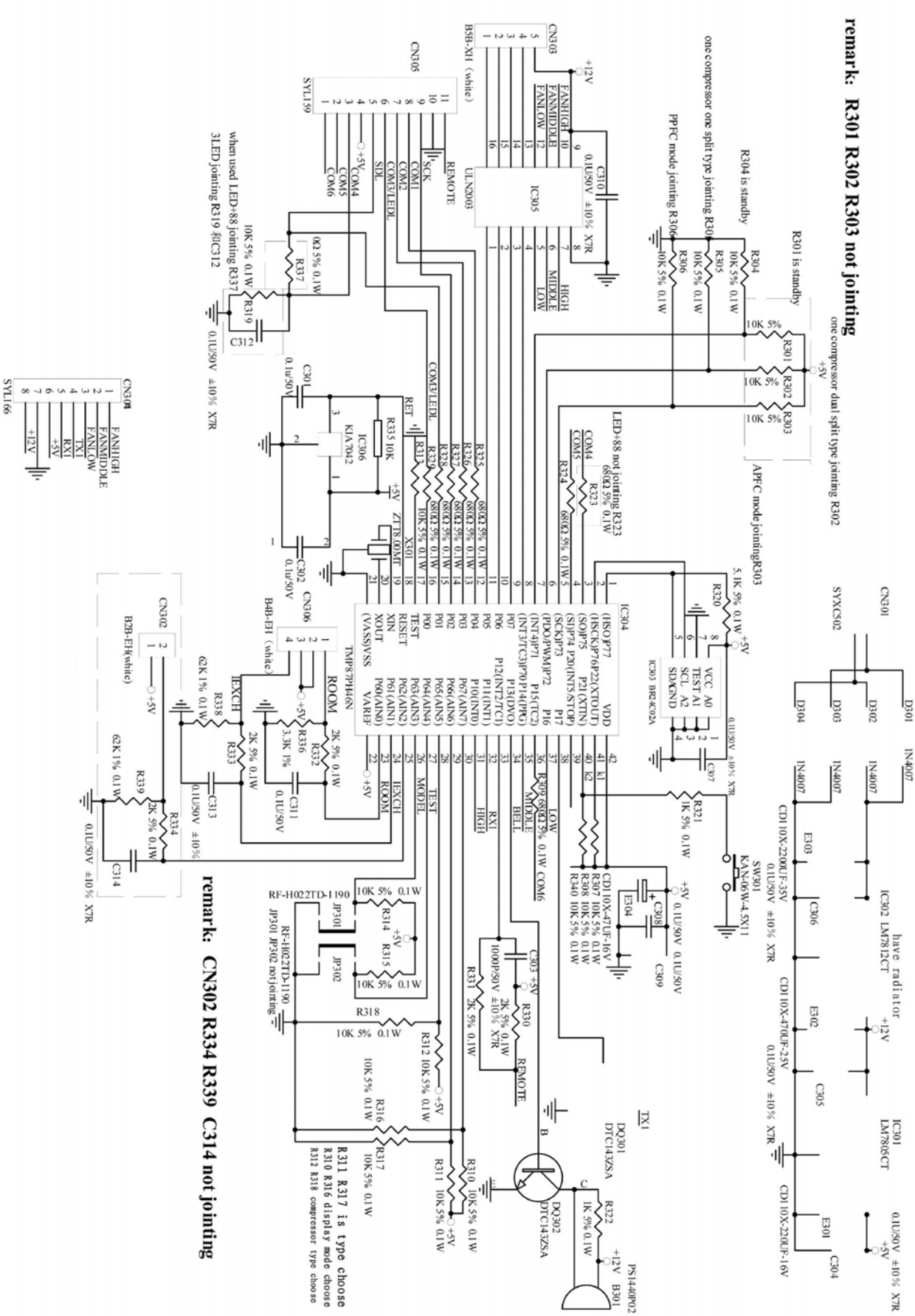


KFR-70GWZ/BM

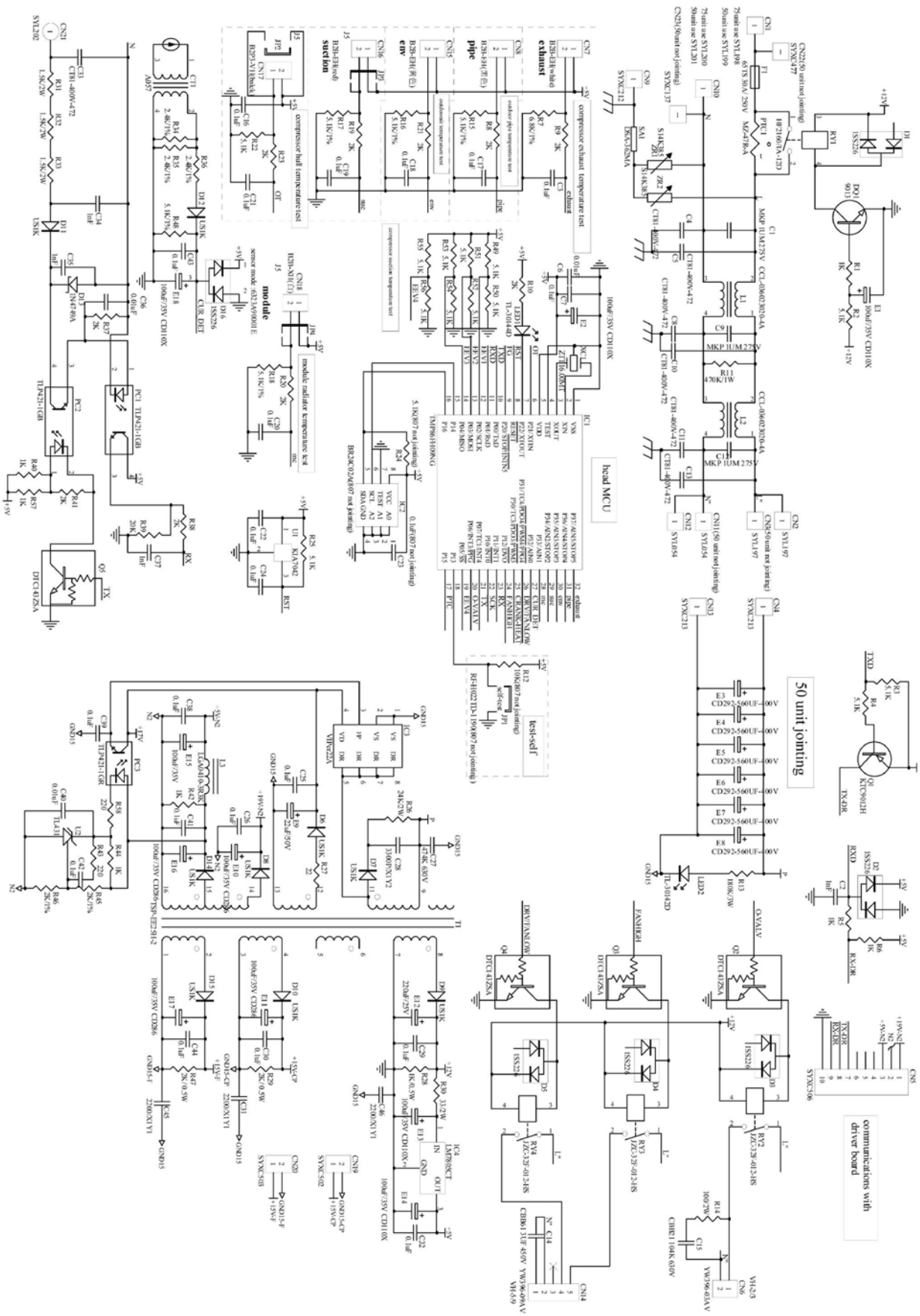
1、 Indoor power board



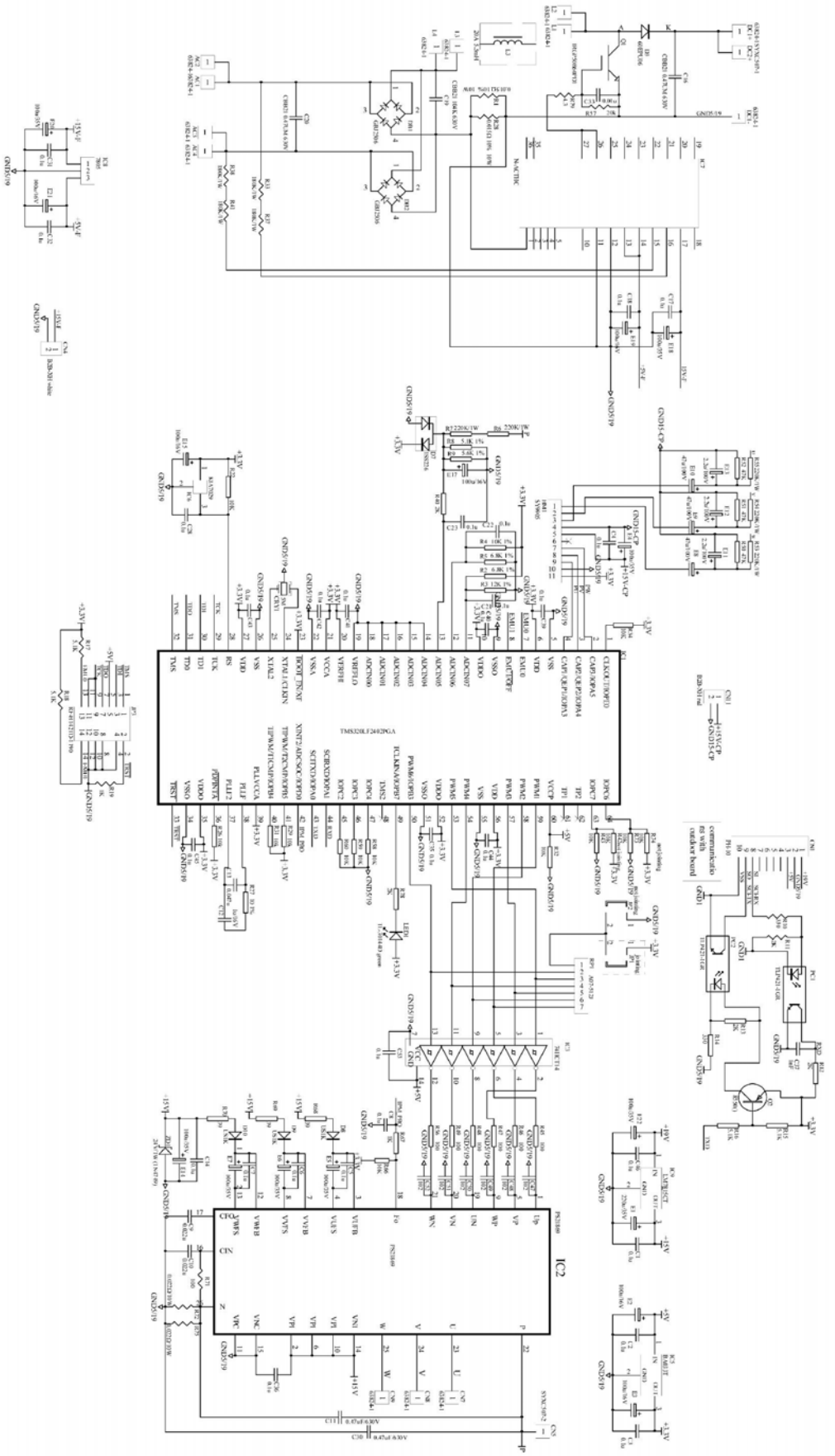
2、Indoor driver board



3、 outdoor power board



4、outdoor driver board



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